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THE UNIVERSITY OF ALBERTA

AN ANALYSIS OF CHILD AND FAMILY VARIABLES IN EARLY INTERVENTION

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "An Analysis of Child and Family Variables in Early Intervention" submitted by Sally Rosemary Barros, in partial fulfilment of the requirements for the degree of Master of Education in Educational Psychology.

.....
Supervisor

.....

.....

Date ..April 22, 1991.....

DEDICATION

HEAVEN'S VERY SPECIAL CHILD

by Edna Massimilla

"A meeting was held quite far from earth
'It's time again for another birth,'
Said the Angels to the Lord above,
'This special child will need much love.'
His progress may seem very slow
Accomplishments he may not show
And he'll require extra care
From the folks he meets way down there.
He may not run or laugh or play
His thoughts may seem quite far away
In many ways he won't adapt
And he'll be known as handicapped.
So let's be careful where he's sent
We want his life to be content
Please, Lord, find the parents who
Will do a special job for You.
They will not realize right away
The leading role they're asked to play
But with this child sent from above
Come stronger faith and richer love.
And soon they'll know the privilege given
In caring for this gift from heaven
Their precious charge, so meek and mild,
Is heaven's very special child."

Reprinted from The Edmonton Sun,
October 16, 1980

This research is dedicated to all special children and their parents, but in particular to Rosalind and Tanya, Fran and Julian, Judy and Ryan, Judy and Damion, Phyllis and Tara Lee and Nicholas and Lorraine.

ABSTRACT

A multimethod approach was used to examine the home component of the Early Education program, an intervention program for moderately handicapped infants.

The rationale for early intervention and its origins in compensatory education are examined in relation to the later development of programs for children with more severe handicaps. Previous types of early intervention evaluation studies are reviewed with respect to child and family variables.

The present study used a repeated measures design to evaluate the impact of early intervention on six families with developmentally delayed infants. The following measures were taken at specific time intervals over a nine month period: Bayley Scales of Infant Development, the H.O.M.E. Inventory, and observation of parent-child interaction. A parent feedback questionnaire was administered at the conclusion of the study.

The overall effects of intervention were examined using a variety of techniques. An index of intervention efficiency (I.E.I.) was calculated using the Bayley scores, and the program was found to have an I.E.I. of .71. Similarly all children demonstrated increased competence in the two areas measured by the Bayley, mental and psychomotor development. The H.O.M.E. scores show a general but non-significant increase in those areas felt to be correlated with later cognitive performance. Further the program seemed to have a "leveling" effect on the initial differential impact of the individual

home environment on mental development and seemed effective in stimulating those aspects of the home environment correlated with psychomotor development. Examination of the parent and child behaviours using a standard one way analysis of variance, with repeated measures, revealed significant declines in positive mother directed activities on the part of the infant, and attending infant's physical need and physical contact with the infant on the part of the mother. The infants also showed a significant increase in expressive physical behavior. Co-occurrences of certain mother - infant behaviors were explored probabilistically to determine the existence of consistent behavior patterns. Finally the parents' satisfaction with the program was investigated and demonstrated by their positive responses to the Parent Feedback Questionnaire.

The limitations of the present study are discussed with regard to critical sample characteristics and methodological difficulties.

The author concluded that the Early Education Program is effective in ameliorating the progressive intellectual decline typically associated with moderately handicapping conditions. Further this study presents a more general model for evaluating early intervention programs for handicapped infants.

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CHAPTER I

INTRODUCTION

The Rationale for Early Intervention

Increasing the capability and independence of the handicapped has been a growing concern for educators in the past century. Early intervention with the handicapped as one strategy for maximizing their potential has received increasing recognition during the last twenty years (Kysela et al, 1979). Theoretical support for this approach comes from several sources: the growing appreciation for the remarkable plasticity of the central nervous system during a child's early years and a growing body of research pointing to the beneficial effects of early stimulation on developing animals and humans. Considerable clinical support has been, and continues to be, added by the evaluation existing intervention programs.

Samuel Kirk, J. McVicker Hunt, and Benjamin S. Bloom were particularly significant in the translation of theoretical ideas about the importance of early environmental factors into the need for early educational experiences. Kirk (1958) presented evidence suggesting that a child's cultural environment may contribute to retardation, and that education if presented early enough, can increase the abilities of these children. Hunt in 1961 indicated that "substantial increases in intelligence as we now measure it may be possible, ... and society would not be wasting its time to supply nursery school to

retarded youngsters of preschool age". Bloom (1964) emphasized early childhood as the greatest period of cognitive development, and pointed out this time as having the greatest potential for educational intervention.

Because of the potential benefits attributed to a stimulating early environment, a rapid development of intervention programs for young handicapped children has occurred.

Types of Mental Retardation

Tjossem (1976) differentiates between three groups of children in need of early intervention to insure optimum development:

(1) children at established risk for delayed development - those children displaying early appearing aberrant development related to diagnosed medical disorders.

(2) child at environmental risk for delayed development - those children displaying delayed development consequent to depriving life experiences.

(3) children at biological risk for delayed development - those children with increased probability for delayed development subsequent to biological insult(s).

Differentiation between these three groups of children is important because of the unique requirements of each group in relation to diagnosis, identification, and intervention strategies. They are not, however, mutually exclusive, and the characteristic elements of each often occur in interaction to further increase the degree of, or probability for delayed development. Interactions of environmental with biological

and established risk factors that act to limit the development of handicapped infants are pervasive. For example, precipitated by early developmental flaw, environmental factors are often joined sequentially in the life of the damaged infant to establish interaction patterns that systematically act to diminish his developmental potential and opportunities for normal life experiences.

It was this second group of children, those considered at risk due to impoverished or unstimulating environments, that became the focus of initial program development and research efforts. These programs optimistically hoped to combat the destructive effects of poverty on human development. These "compensatory" intervention programs were the forerunners of later programs for more severly handicapped children, those at established risk for delayed development. Because of the significant contributions made by compensatory education programs to later programs for more severly handicapped children, their development will be examined briefly here.

Programs for Children at Environmental Risk

The first well designed experimental programs of preschool intervention were implemented by Samuel Kirk, Susan Gray, and D.P. Weikart. These programs produced initial gains of up to fifteen or more I.Q. points in the space of a few months. These experiments were followed almost immediately by the widespread adoption of state and federal intervention programs in the United States, most notably the Head Start Program.

Based on a deficit approach to early development, these first programs began as summer "enrichment" experiences aimed at remediating or improving children's language and cognitive skills prior to school entrance in the hope that this would offset the progressive retardation observed in the school careers of deprived children. Other types of program implementation quickly followed including summer programs and home visits (Gray, 1970); intervention implemented by mothers at home (mothers met in groups weekly, supplemented by home visits, Karnes et al, 1970); and daily visits by tutors (Schaefer, 1968).

The evaluation of these early intervention programs has contributed most of our knowledge to date regarding the effectiveness of educational intervention. Results from Head Start and other programs were disappointing. Initial gains in cognitive functioning resulting from intervention were not sustained. Gains were "washed out" as control children caught up with experimentals when programs were discontinued. These results did not surprise some researchers who felt that these programs had been adopted prematurely. Bronfenbrenner (1974), for example, states "these programs were implemented primarily for reasons of social policy rather than demonstrated scientific validity."

The failure of these programs to demonstrate sustained improvements in cognitive functioning, led to the examination of different types of curriculum and instructional methods in an effort to explain their disappointing results. In

1975, Miller and Dyer conducted an examination of the effectiveness of four different model pre-school programs. Although showing the expected initial rise in I.Q. (particularly in those didactic programs emphasizing cognitive goals) children from all four programs declined in I.Q. over a four year period. Only non-cognitive effects were demonstrated at the end of the four year period. They concluded that method of instruction is not responsible for the "wash out" effect demonstrated by most intervention programs.

Researchers began to look outside the school for the failure of these programs to maintain their initial effectiveness. The source of their failure appeared more likely to exist in the broad context of early experience. Bronfenbrenner (1974) in an evaluation of twelve pre-school programs for children aged 0 - 6, drew several important conclusions regarding the nature of early intervention programs. Most significant of these was the importance of mother-child interactions in which the mother acts as both a responsive initiator and a sustainer of the child's early experience. He offers as evidence for this conclusion comparisons between studies involving direct intervention with infants (Schaefer, 1968; Schaefer & Aaronson, 1972) and those in which interventions are made through the mother (Levenstein, 1970).

Schaefer (1968) found no positive effect with disadvantaged infants by beginning direct intervention in the home at eighteen months. Levenstein (1970) who focused on the mother-child dyad, verbal interaction, and the mother as change agent,

found substantial gains in children entering the program at two, which were maintained 3 - 4 years after program termination. Karnes and Badger (1969) using a similar approach found similar results with a three year follow-up.

Bronfenbrenner concludes that the primary objective of intervention during the first years is the establishment of an enduring emotional relationship between parent and child involving frequent reciprocal verbal interaction around activities which are challenging to the child. More recently other authors (Berger & Fowlkes, 1980; Bricker & Casuso, 1979) have stressed the importance of involving of the entire family in the intervention process.

Bronfenbrenner came to several other conclusions that have significantly effected the development of current intervention efforts. These included:

(1) the effects of intervention were cummulative from year to year both during intervention and following completion of the program.

(2) the magnitude of I.Q. gain was inversely related to the age at which intervention began, with the greatest gains being made for children enrolled as 1 to 2 year olds.

(3) children who were involved in an intensive program of parent intervention during, and especially prior to their enrollment in a group program, achieved greater and more enduring gains in the group program.

(4) parent intervention influenced the attitudes and

behavior of the mother not only toward the child but in relation to herself as a competent, capable person.

Feedback from these early programs has resulted in experimental modifications in current programs in which the parent has replaced the teacher as the prime implementer of instruction, the home has replaced or shares with the preschool as the site for intervention, and children under three are enrolled.

Programs for Children at Established Risk

Against this background of programs for the environmentally deprived, there has been a rapid growth of programs for the "established risk" or more severely handicapped child. Support for these programs embraces many of the same theoretical underpinnings as programs for the disadvantaged: that is, the plasticity of the human nervous system and the beneficial effects of early stimulation; however, program development has been clearly stimulated by the changing attitude of professionals and the community at large about the learning potential of the retarded individual.

Various treatment alternatives are now possible, whereas previously institutionalization was considered the only solution. Community attitudes and programs for the retarded have been effected by the work of Wolfensberger (1972) who advocated more humane programs for the retarded emphasizing the creation of as "normal" an environment as possible for

for these individuals. Legislative developments in the U.S., specifically Law 94-142, the Education for all Handicapped Children Act (passed November 29, 1975), guaranteeing the right of handicapped children to an education in the "least restrictive environment", have further stimulated the search for new and more effective ways of helping the handicapped child function within his community.

Changing attitudes towards the treatment of moderate to severely handicapped children have been supported by a number of research developments. As early as 1939, researchers demonstrated the importance of early stimulation in the development of cognitive functioning. Quite accidentally, Skeels and Dye (1939) found that two eighteen month old children from a state orphanage, both moderately to severely retarded, who were placed in an institution for the feeble minded (through lack of space) showed dramatic increases in I.Q. scores compared to children who remained in the orphanage. As a result of this discovery, Skeels and Dye persuaded state authorities to allow an informal transfer of one and two year old mentally retarded children from the state orphanage to the state school for the retarded. A contrast group of children remained in the orphanage. Children in the experimental group were placed singly or in pairs with brighter and older girls at the state school.

Over a period of two years the experimental group showed a mean I.Q. gain of 27.5 points while the contrast group showed a loss of 26.2 points. The authors concluded a change

from retarded to normal intelligence may be possible, in the absence of organic pathology, by providing these children with a more adequate psychological environment.

Despite this important discovery, early intervention for the handicapped has only received significant attention in the last 20 years. Recent research in medicine and genetics has led to impotant contributions in understanding and preventing numerous handicapping conditions. In 1959, for example, it was discovered that Down's Syndrome is the result of chromosomal abnormality. This condition, although initially described in 1866 by J. Langdon Down, a British physician, had previously generated little research or interest on the part of clinicians. It was generally assumed that the eventual prognosis for all children with this condition was consistently poor. The discovery of chromosomal abnormality led to a change in research emphasis and accordingly to renewed interest in the treatment of this handicapping condition. Down's Syndrome has received increasing attention from researchers and clinicians for a number of reasons. This condition is the most prevalent form of severe mental retardation, occurring once in every 640 live births, and its prevalence is increasing due to improving medical technology that has found the means to keep these children alive, and to keep them alive longer. Down's Syndrome has also been the subject of much study due to the ease of diagnosis with this condition. Down's children can be identified at birth or shortly after due to the characteristic physical

stigmata displayed, and their chromosomal abnormality. These standardized identifiers make comparability with different populations easier and also make Down's Syndrome prime targets for intervention due to their early identification and the known retardation that accompanies this condition.

Whereas, until this time, the primary recommendation for these children's care was institutionalization, alternative approaches to treatment began to appear. Studies began to appear comparing home reared with institutionalized Down's Syndrome children (Cornwell and Birch, 1969; Stedman and Eichorn, 1964; Ludlow and Allen, 1979) indicating the superior intellectual and social functioning of children reared at home. Stedman & Eichorn (1964) compared the growth and development of 20 Down's Syndrome children, 10 of whom had been institutionalized at birth, 10 of whom who had been reared at home. Using the earlier versions of the Bayley Infant Development Scale, and the Vineland Social Maturity Scale, the home reared group was significantly superior in mental test scores, and social quotient. No statistically significant differences in motor performance were found. Three anthropometric measurements; leg length, weight, and calf circumference were significantly larger among the home reared group. The authors identified two elements of home care that seemed most germane to the superior development of the home reared children:

(1) the active coaxing and coaching for performance

which was observed in the home and verbalized by mothers; and

(2) the stimulation and modelling provided by normal siblings or peers.

In a more recent study, Ludlow & Allen (1979) compared three groups of Down's Syndrome children: Group A was raised at home involved in an intervention program; Group B was raised at home with no such program and Group C was raised in an institutional setting. On personal, social, speech, and general developmental quotients, the home reared group (group A & B combined) scored significantly higher than the institutionalized group. Other important differences between group A (stimulated) and group B (unaided) were also noted, which will be discussed later in this paper. Other studies (Centrewall & Centrewall, 1960; Shipe & Shotwell, 1964; Carr, 1970) have demonstrated significant benefit to home reared versus institutionalized handicapped children.

In addition to the growing realization of the superiority of raising Down's Syndrome children at home compared with institutional care, more and more clinicians are coming to the realization that Down's Syndrome children are not as similar in intellectual ability as has been assumed due to their similar physical characteristics. Connolly (1978) examined the intelligence levels of 180 children diagnosed as Down's Syndrome and found an I.Q. range of 20 - 100 as measured on the Stanford Binet or WISC. Forty per cent of the sample had I.Q.'s above 50. He concludes there is a 3-point effect on intelligence: the normally inherited variables in potential,

the effects of the genetic anomaly, and the effects of what is referred to as brain damage. Those cases falling into higher I.Q. ranges reflect a more positive perinatal environment, as well as a more stimulative developmental environment. It is this second feature that has yet to be provided for all subjects (Connolly, 1978). Cicchetti & Sroufe (1976) also refer to the "heterogeneity" of Down's Syndrome children in their study of the relationship between affective and cognitive functioning in Down's Syndrome children. In their study of 14 Down's Syndrome children, 4 showed very retarded development while others developed at a much more rapid rate, perhaps not qualitatively different from normal infants. Many researchers have reported decreasing intellectual and developmental quotients with increasing age in Down's Syndrome children (Cornwell and Birch, 1969; Clunies - Ross, 1979). The latter researcher, for example, states that Down's Syndrome children decline progressively in performance relative to normal children, beginning at 80% equivalency at one month, and falling to 50% equivalency between 2 and 4 years.

The case for early intervention, particularly with children under 3, has been further facilitated by our expanding knowledge of normal infants (Hayden, 1979). Innovative methods of study and technological advances have introduced us to the amazing capabilities of babies, and that babies can be taught. Handicapped as well as normal infants can be taught; however, the handicapped infant has highly specialized needs requiring specific teaching and individualized programs.

Whereas in the normal child, the stimulation supplied by his typical environment is sufficient, with the handicapped child increased and very specific input may be necessary to promote more normal development.

In light of these numerous research findings, including the benefits of home care for the retarded child, the heterogeneity of functioning among the retarded, and the progressive decline in functioning with many handicapping conditions, specific programs began to appear designed to prevent or slow down the progressive decline in intelligence demonstrated by the moderately to severely handicapped child.

Current Problem

The programs developed for the moderately to severely handicapped child vary widely in terms of the children served, delivery system used, and curriculum and teaching strategies employed. Generally speaking, in contrast to compensatory preschool programs which offer an enrichment experience at the child's learning pace, programs for the more severely handicapped have been characterized by training objectives and approaches focal to the particular handicap. Intervention programs for retarded children, for example, incorporate the principles of operant conditioning because of their previously established value in teaching retarded children specific developmental skills. In general terms, programs for the mentally handicapped have attempted to facilitate learning through the provision of more learning trials and opportunities in several areas of development at the next development level. Objectives for each infant are derived from normal development

and broken down into fine steps. The child is then rewarded for successive approximations to the desired goal. The child's performance is recorded daily to determine each child's progress or lack of it. Thus successful techniques can be identified, and unsuccessful programs modified as needed.

The Early Education Program

One program that employs such an approach is the Early Education Program, Edmonton, Alberta. This program has developed both home and school based programs for severely handicapped preschoolers (birth to six years) using an applied behavior analysis approach (Kysela et al, 1979). The staff employ a behaviorally based developmental curriculum which encompasses 5 areas of development: cognition, self help, language, motor, socialization (See Appendix A). The curriculum is implemented using a criterion-referenced test teach method of instruction; a standard program construction and implementation procedure; a systematic data collection format for behaviors being taught; and an incidental teaching framework for maintenance and generalization (see Table 1).

It is the home based program that is of interest in the present study. The home based program provides services for developmentally delayed children from birth to 2½ years.

Evaluating the Early Education Program

In describing the Early Education Program, Kysela and his colleagues (1979) state "the goal, of course, was the design of an effective intervention system for developmentally

TABLE 1

COMPONENTS OF INSTRUCTIONAL DESIGN OF THE EARLY EDUCATION PROJECT, HOME PROGRAM

HOME PROGRAM, Children from birth to 2½ years of age.
1. Criterion-referenced assessment to identify initial point for teaching.
2. Implementation of behaviorally-based teaching curriculum by the parents* using direct, and incidental teaching models as well as structured teaching programs.
3. Systematic data collection by patents* during learning, review and maintenance to monitor progress.
4* During weekly or biweekly home visits, the skills to be taught and methods to be used are demonstrated by the home teacher to the parent.

delayed infants and toddlers." The realization of this goal, that is, the design of an effective intervention system, is the basic component of program accountability and of interest to everyone involved in early intervention.

Assessing the effectiveness of a program has many parameters. For example, one aspect of effectiveness is the program's applicability when used by teachers and parents to attentuate developmental delay and foster more typical development. The Early Education Program's applicability has been demonstrated by ongoing use and the positive response to its teaching programs and curriculum. The most common demonstration of a program's effectiveness is the provision of normative data reflecting the child's increased performance. Children in the Early Education Program have demonstrated positive increases in performance as measured by both the Stanford-Binet and the Bayley Infant Scales (Kysela et al, 1979).

A further but more difficult measure of effectiveness involves the impact of the program on children and parents in terms of their generalized use of skills in their natural environment. It is this measure of efficacy, the development of generalizable skills, that the present study will address. Firstly, does the home teaching component of the Early Education Program develop new skills with moderately to severely handicapped infants and secondly, are these skills generalized to their daily living environment? Thirdly, does this program result in parent teaching skills which can be used by them in their daily interactions with their child? A fourth, and most

important question relates to the nature of the interactive process between mother and child. Has their been a change in the nature of the parent-child relationship as a result of participation in the program and in what way has the interaction changed?

CHAPTER II

REVIEW OF THE LITERATURE

The Need for Program Evaluation

As we have seen in the previous chapter, the increasing number of experimental compensatory programs which have examined critical components of intervention (age of intervention, parent involvement, site of intervention, curriculum, and instructional methods) have established a basis for early intervention with "deprived" or "environmental risk" children. Further, outcome variables have now been expanded, as a result of longitudinal studies, to include later non-cognitive development, and academic achievement.

Unfortunately much less is known regarding the effects of early intervention for children with disorders of constitutional origin. Studies of "established risk" children are few, and complicated by the heterogeneity of disorders subsumed under the rubric of mental retardation. These studies are difficult, time consuming, expensive, and often provide equivocal results. Further, studies of this type have been overshadowed by the large number of studies made possible by Head Start and facilitated by the well developed system of preschools. No comparable base for studies of intervention with infants and/or established risk children has existed until very recently. The Bureau of Education for the Handicapped in providing funding for experimental programs through the Handicapped Children Early Education Program, has established such a network in the

United States. Their funding grant requires that project grantees establish a plan for project evaluation, including assessment of the progress of enrolled children. Although the establishment of such a requirement in the granting of public funds is certainly a beginning, the problem of the diversity of evaluation measures remains. For example, among the 150 projects funded through this government agency alone, widely differing types of assessment approaches are employed, ranging from subjective reports, anecdotal records, and rating scales to objective, criterion referenced check lists and behavior counts. The evaluation issue is further complicated by the wide variety of variables examined and presented as demonstrating program effectiveness. Van Biervliet (1979) describes evaluation research as the use of scientific methods for determining: (1) the effectiveness of the program in achieving its goals, (2) the impact of the program upon the target population and the surrounding social and physical environment, (3) the efficiency of the program in terms of expenditures of funds and manpower, and (4) the success of the program in comparison with alternative programs for achieving the same goals.

Despite the diversity in assessment procedures and program variables examined, there is universal agreement among researchers, clinicians, and policy makers alike on the need for program evaluation (Tjossem, 1976; Karnes & Zehrback, 1977; Cohen and Leavitt, 1975; Hanson, 1977; Zigler and Trickett, 1978; Hayden, 1979). Zigler (1978) states that the case for developmental intervention programs is ultimately contingent upon the demonstration of their value and effectiveness. Similarly, MacTurk and Neisworth (1978) state "we are past the

day when intervention programs can be supported on faith and in the absence of evidence for their efficacy." The call for evaluation comes from professional, moral and economical perspectives. Van Biervliet (1979) outlines the importance of evaluation research with specific reference to the technology of applied behavior analysis: (1) the need for the improvement of techniques dealing with pressing social problems (moral and professional), (2) the need to preserve the integrity of applied behavior analysis (professional), (3) the rights of consumers (moral and professional), (4) the current legal challenges to applied behavior analysis (professional) and (5) the intense competition for local, state and federal funds (economical). Or put another way, "Most of all we need to carefully evaluate every intervention effort. Helping parents to help their handicapped baby is a major responsibility. We cannot take this charge lightly" (Hayden, 1979).

Introduction

Given the general agreement on the need for evaluation with intervention programs for "established risk" children, let us examine the types of evaluations that have been carried out to date. Evaluation studies seem to fall into two broad categories: those that examine specific aspects of the program in relation to its overall effectiveness, described as the efficiency of the program (Van Bievlet, 1979); secondly, those that examine the outcome or impact of a particular

program on its target population. Van Biervlet (1979) describes these latter types of evaluations as examining the "social validity" of the program.

Measures of Program Efficiency

Within the broad category of studies examining program efficiency, some studies examine the intervention effort in terms of child variables, whereas others examine efficiency in terms of program variables. The most frequently examined child variables are age at onset of intervention and severity of handicap. These variables are rarely examined exclusively, but are often included in the overall effectiveness of a given program.

1. Child Variables

Maisto and German (1979) evaluated the efficacy of a parent - infant training program for high risk infants. The evaluation was accomplished by assessing early development along both cognitive and language dimensions in terms of initial age of entry, sex, and degree of initail cognitive delay. Thirty-two infants were included in the study and measures of cognition and expressive and receptive language were taken at three month intervals. On cognitive measures their results indicated significant interaction between age and the evaluation period, initial severity and the evaluation period, plus marginal significance between the three factors age, initial severity, and evaluation period. Similarly, with expressive language, there were significant main effects with both age and evaluation. No reliable effects

were indicated in the analysis performed on the receptive language measure. The authors summarize their results by stating that positive change appears to be possible in programs which employ parents as the primary educational agents. Severely impaired infants in particular, seem to be responsive to treatment if the intervention occurs within the first few months of life (before 11 months notably).

One of the best known experimental programs for severely handicapped children is the program for Down's Syndrome children at the Experimental Education Unit, University of Washington, U.S. The coordinators of the program, Hayden & Haring (1976) conducted an evaluation study involving 94 Down's Syndrome children. Their results indicated that children who did not attend the Model Preschool appeared to be leveling off at 61% of normal development, while Model Preschool graduates appeared to be leveling off at approximately 95% of normal development. They concluded that while a behavioral program seems to be of value with any Down's child, it is apparently of <u>greater</u> value if begun during the child's early pre-school years".

2. Program Variables

(a) Service Delivery - frequency and type of program implementation

In terms of program variables, some researchers have investigated the frequency and type of program implementation in terms of its impact on program efficiency.

Sandow & Clarke (1978) examined the impact of frequency of contact between home visitor and parent on program

outcomes. They compared two groups of severely handicapped children (N+16): Group A was visited every two weeks for two hours while group B was visited every two months for the same time period. Despite their prediction to the contrary it was found that after the first year the less frequently visited group (B) surpassed group A in cognitive functioning and the end differentials were insignificant. The authors explain their results by suggesting that the parents in group B were forced into the role of protagonist and became more competent people capable of improving their own situation. Group A parents on the other hand became increasingly dependent on the home visitor.

A similar study conducted by Baker & Heifetz (1976) examined the effectiveness of various instructional techniques in terms of the amount of face to face contact in teaching parents behavioral techniques for use with their retarded children. One-hundred and sixty families participated in the project and were randomly assigned to five experimental conditions: Condition C - control group, received delayed training; Condition MO - all contacts with parents in this group were by mail, including provision of teaching manual; condition P - as in condition MO, all receipt and distribution of materials was by mail, but their use of manuals was supplemented by bi-weekly phone calls; Condition G - while using manuals, parents participated in a training

program consisting of nine two hour meetings; Condition GV - the group training component of this condition followed the same format as condition G, but also included six one hour in-home consultations. Their results showed that parents in conditions MO and P (where logs were mailed) filled out their daily teaching logs at a significantly lower rate than those in conditions G and GV (where logs were handed in) - 45% as compared to 59% of days logged. Similarly, parents in G and GV conditions carried out programs in twice as many additional areas (other than the one involved in instruction) than parents in MO and P conditions. Quite unexpectedly mothers using the manual alone showed the largest gain in knowledge of behavior modification principles. Father knowledge, on the other hand, increased with increasing trainer contact. The children in the project demonstrated both direct and indirect gains in the areas of self help and toileting skills in all conditions. With behavior problems, however, condition GV (only) was superior to the control group, and significantly superior to all other conditions. Post training attitude questionnaires revealed that manual only parents felt less confident in their teaching skills than any of the other three conditions or the controls. It remains to be seen whether this lack of confidence will become a liability for the MO parents, however, the authors concluded that some group training

structure with fewer meetings and greater parent reliance on media and each other will be an eventual compromise, maximizing all gains. (p. 368)

(b) Location of intervention programs

It is generally agreed that the best place for severely handicapped young children is in their own homes. This has been demonstrated by intervention programs for deprived young children (Levenstein et al, 1973; Bronfenbrenner, 1974) and incorporated into programs for the more severely handicapped young child.

Home programs use various models for service delivery (Dudzinski & Peters, 1977). These include:

(i) Home Visitation - home visitor makes reocurring visits (a) to work directly with the child;
(b) to work directly with mother;
(c) to work with mother/child dyad.

(ii) Parent group meetings and workshops in the home - alone or in conjunction with home visitation.

(iii) Home visits, group meetings plus group experience.

(iv) Remote parent control involvement.

(v) Combination of techniques.

Dudzinski and Peters list six key elements of successful home programs:

(i) Structure of the learning situation - learning situation has a goal or a purpose.

(ii) Individualization of program activities - they are designed to meet present skill level of parent and child.

(iii) Focus on mother - child dyad - the focus of intervention is the mother-child dyad as an active, ongoing system. It is hoped that parent and child will develop an enduring interaction system so that when intervention stops mother can continue to modify her strategies for dealing with her child as he or she grows and matures. The thrust of intervention is not on individuals, but on modifying interaction between mother and child.

(iv) Secondary role of home visitor - the emphasis of instruction is placed on mother; the home visitor is a resource and catalyst. We have already seen how frequency of visits may effect this function of intervention (Sandow & Clark, 1978).

(v) Parental motivation - parents are motivated.

(vi) Family support system - the needs of the family will determine how extensive the support system needs to be.

Dudzinski and Peters summarize some of the research on the effects of home based intervention programs in terms of parent's behavior. Lasater et al (1975) found parents more responsive to their children, more sensitive, and more responsive to their children's requests and signals. Leler et al, (1975) found parents warmer, more autonomy-granting, and greater users of reasoning and praise. Richer verbal interaction and increased verbal interaction with their children was found by Lambie et al

(1974) and Andrews et al (1975). Lambie et al (1974) and Leler et al (1975) found parents more likely to provide appropriate play materials as a result of intervention.

The two major advantages of home based programs are low cost and gains which tend to last. Stedman (1977) states that the effects of intervention programs last longer in home based programs, that is, they don't "wash out".

3. Teachers

The third area of program efficiency involves the use of parents as teachers of their handicapped child. This is an integral part of home based programs, although other kinds of programs vary in the type and extent of parent involvement. Researchers agree on the importance of parental participation for a number of reasons: (1) insufficient numbers of professionally trained staff; (2) less use of trained staff, therefore, less expensive; (3) the parent is apt to be more reinforcing than other adults; (4) more enduring results - provides parent with teaching skills that can be used after completion of the intervention program. Bronfenbrenner in his much quoted review of selected preschool programs, states that involvement and active participation of the child's family are <u>essential</u> to the success of any intervention program. Although this view of the critical nature of maternal involvement for later success has been accepted by many, empirical support for this position is limited. As stated by Maisto and German (1979), "the assistance and education of parents

by early interventionists and their inclusion in intervention programs are accepted as necessary activities if the child is to make maximum progress, however, objective information on parental involvement is minimal, and the direct effect on program success has yet to be documented".

A study conducted by Bidder, Gray and Bryant (1975) explored the benefits of Down's Syndrome children accomplished through training their mothers. The compared rates of development of Down's Syndrome children whose mothers had been instructed in and used behavior modification techniques in training their child with a control group whose mothers received no training (N = 8). They reported significant improvements in all areas, except locomotion, as measured by the Griffiths Scale by the mother taught group when compared to the controls. Particularly significant was the treatment group's improved performance in the language area. In addition to improved performance on the part of the children in the treatment group, the mothers of these children reported increased skills and confidence and improved morale from meeting with other parents.

Bricker and Casuso (1979) caution against using the child's progress as the sole measure of the success of parental involvement. They suggest that other equally important variables such as program effectiveness with parents, subsequent school placement upon graduation from early intervention program, and assisting families in

keeping their young handicapped child at home, with the provision that both children and family members can lead happy, productive lives, should also be considered.

Measures of Program Efficacy

The majority of evaluation studies conducted on early intervention programs for handicapped infants to data have examined the effects of the program on the target population and the surrounding social and physical environment. Van Biervliet (1979) refers to this process as an analysis of the social validity of the program. Of these studies, the vast majority use cognitive development of the handicapped child as the indicator of program success. Other measures of child progress, as well as measures of the social and physical environment have been used, but to a much lesser extent.

1. Cognitive measures of program efficacy

Cognitive measures are of two types: broad based evaluations that use periodic administration of normative instruments to compare target children against other children or fine grained evaluations that examine the child's progress on a particular curriculum. Scriven (1966) differentiates these two types of program evaluation as summative and formative: formative evaluations are directed towards current program activities whereas summative evaluations are concerned with the overal worth of a particular program.

Researchers disagree on the validity of these measurements

techniques as indicators of program efficacy. Proponents of criterion referenced measures argue that norm referenced devices may be insensitive and irrelevant to project-induced child progress. On the other hand, advocates of more referenced instruments state that gains on idiosyncratic measures may not relate to important developmental changes or indicate significant improvement when compared to a wider comparison group.

In reality it appears that the two assessment methods serve different purposes. This is illustrated in Hanson and Bellamy's (1977) discussion of the need for continuous data collection. They state "decisions must be made about whether specific intervention techniques are having their desired effect or if a specific set of steps are in fact leading to a desired objective". This type of continuous data collection, however, presupposes a program based on the basic principles of behavioral analysis: (1) specific developmental objectives have been defined: and (2) criterion levels of performance defined for progress through each step. Assuming the existence of such a program, continuous data collection facilitates individual programming and communication between parent and program consultant. It enables parents to become active, informed participants in the intervention process. Further behavioral changes can be specifically attributed to intervention procedures and validate the use of specific intervention techniques.

MacTurk and Neisworth (1978) address the issue of the utility of these two measures in assessing children's progress. They used a standardized norm based measure, the Gesell Developmental schedules; and the HICOMP Curriculum as their criterion measure. Seventeen children in a developmentally integrated, behaviorally based preschool (seven handicapped and ten non-handicapped) were assessed quarterly on the two measures. Their findings indicated a high correlation between both types of assessments for the handicapped group but not the non-handicapped. They concluded therefore, that the Gesell developmental quotient, and the criterion measures yield approximately similar information for the handicapped children, and that much of the controversy over use of these instruments can be avoided if norm based and criterion based measures are approximately matched and employed in closely monitored child programs.

In fact, the majority of researchers have used normative techniques to assess program efficacy (Russell & Connolly, 1976; Hanson & Swarz, 1978; Clunies - Ross, 1979; Ludlow & Allen, 1979; Hanson, 1977; Maisto & German, 1978; Hayden & Haring, 1976). Two types of normative techniques have been used: (1) the client's measured performance is compared with non-deviant or non-delayed peers; (2) the client's measured performance is compared with an established norm. Russell & Connolly (1976), for example, compared forty Down's Syndrome children in an intervention program with normative data for Down's Syndrome children. They found that children in the intervention program attained motor milestones earlier,

particularly those who began the program prior to six months of age. Similarly, Hanson & Swarz (1978) compared the developmental milestones of twelve Down's Syndrome children with Down's Syndrome children not in an intervention program against normal developmental milestones. They found that the experimental group achieved developmental milestones later than normal children, but consistently earlier than Down's Syndrome children not involved in intervention.

Clunies - Ross (1979) found that systematic early educational intervention markedly accelerates the development of Down's Syndrome infants and young children.

Ludlow & Allen (1979) used the Stanford - Binet Intelligence Scale and the Griffiths Developmental Scales in a comparative study of three groups of Down's Syndrome children: Group (1) Seventy-five children received planned preschool stimulation (for a minimum of two years prior to their fifth birthday), and supportive counselling for parents: Group (2) Eighty children who developed spontaneously in their own home; and Group (3) Forty-three children who were institutionalized shortly after birth. Their results confirmed that early intensive preschool stimulation coupled with parental counselling and full maternal involvement reduced the traditionally observed decline in Down's Syndrome children.

Hanson (1977) compared the developmental milestones of Down's Syndrome children in the University of Oregon Intervention Program with normative data for Down's Syndrome children (provided by a study done on 211 Down's Syndrome

children, Share & Beale, 1974), and with norms of the Denver Developmental Screening Test. Their results showed that infants involved in the University of Oregon program exhibited behaviors designated as developmental milestones at an earlier age than a comparison group of infants not receiving direct intervention. Further, these behaviors when compared with normal development as indicated on the Denver, occurred close to the normal range of development.

For example: sitting unsupported - Univ. Oregon: 8½ months
Share & Veale: 11 months
Denver: 5½ months

rolling over- - Univ. Oregon: 4½ months
Share & Veale: 7 months
Denver: 2 3/4 mos.

Other researchers previously mentioned who examined the efficiency of particular program components (Maisto & German, 1979; Hayden & Haring, 1976; Bidder, Bryant & Gray, 1975), all used normative measures of intellectual performances as indicators of program success.

Researchers who have used criterion referenced measures alone are less frequent. More commonly, clinicians (Kysela et al, 1979; Hanson, 1977; McTurk & Neisworth, 1978; Shearer & Shearer, 1972) have used both types of measures to demonstrate program success. Hanson, for example, used both types of assessment techniques to demonstrate the effectiveness of her University of Oregon intervention program. She used a multiple baseline design to see if specific training procedures were functionally related to infant performance gains. She

concluded that the skill acquisition demonstrated by her three subjects allowed for the interpretation that infant behavior was functionally related to the training procedures used.

One of the most well known programs for young, handicapped children is the Portage Project (Shearer & Shearer, 1976). Using both the Stanford-Binet Intelligence Scale and the Cattell Infant Test as pre and post measures, the average child in the project gained fifteen months over an eight month period. Further, children were successful on 91% of prescriptions written by home teachers during the program year. An experimental study was conducted comparing randomly selected children attending local classroom programs for culturally and economically disadvantaged preschool with Portage program children. The greater gains made by Portage Project children in the areas of mental, I.Q., language, academic and socialization skills were all statistically significant compared to the group receiving classroom instruction. Using these same children as their own control, mean gain I.Q. scores on the Stanford-Binet was 18.3, and statistically significant beyond the 0.01 level (Shearer and Shearer, 1972).

2. Social Functioning as a Measure of Program Efficacy

Although the I.Q. score, or more typically, the change in the child's I.Q. score has been the most frequently used outcome measure over the twenty year history of early intervention, some researchers are highly critical of the use of this measure alone as an adequate indicator of program success. Zigler and Trickett (1978) see the formal cognitive functioning

assessed by I.Q. tests as only one aspect of human functioning, or as they put it "we believe that one can obtain a very high I.Q. score, and still not behave admirably in the real world that exists beyond the confines of the psychologist's testing room" (p. 791). They propose instead that social competence should be employed as the major measure of success in intervention programming.

However, this construct has not been adopted on a widespread basis by early interventionists, due to the lack of consensus as to what constitutes social competence. The construction of a social competence measure is an important task for social scientists according to Zigler and Trickett. They suggest several measures that should be included in a social competence index: (1) a measure of physical health and well being; (2) a measure of formal cognitive ability; (3) achievement ability; (4) motivational and emotional variables. Finally they conclude that adequate social competence assessments can be achieved if we commit ourselves to both long-term and molar measures of intervention. They encourage social scientists to pursue the task of defining an adequate measure of social competency before the task is taken over by politicians and policy makers.

The use of an I.Q. score as the exclusive indicator of program success is also questioned by Stevenson and Lamb (1979) in an interesting study that examines environmental factors, infant sociability, and cognitive competence in twelve month old infants. They found a strong relationship between the infant's sociability as measured by his initial reaction to

an unfamiliar adult prior to testing, and three items from the Bayley Infant Behavior Record: social orientation, co-operativeness and general emotional tone, and cognitive competence as measured by the Bayley and the Ordinal Scales of Psychological Development. The sociable, friendly infants received higher scores on both cognitive tests than the less sociable infants did. In conclusion Stevenson and Lamb caution that when using cognitive test scores to assess the effectiveness of an intervention program, it is most important to remember that test scores are reflections of sociability as well as cognitive abilities.

A few researchers have included more molar measures of program effectiveness as suggested by Zigler and Trickett. Ludlow and Allen (1979) for example, examined the later school placement of children enrolled in an intervention program. They found that an increased number of Down's Syndrome children who participated in a program of preschool intervention were suitable for integration into normal schools at age five when compared with children who did not attend such a program.

3. Surrounding Social and Physical Environment i.e., a change in Parent's Functioning and Attitudes, as a Measure of Program Efficacy

Although the majority of evaluation studies have focused on the intervention program's impact on the child or children within the program, primarily in the area of their cognitive functioning, some researchers examined the impact of the program on the surrounding social and physical environment. Of particular interest in this area has been the impact of intervention programs in terms of parents functioning and/or

attitudes. Bidder, Bryant and Gray (1975) found that mothers involved in teaching their Down's Syndrome children reported increased knowledge, confidence to carry out plans and to cope with the child, as well as improved morale. Ludlow and Allen (1979) in their study reported "The earliest result of intervention was a change in parental attitude from hopelessness and helplessness to optimism and eager reporting of the child's progress". A parent of a handicapped child who had participated in an intervention program wrote in a 1978 article, "now over a year later I find myself more and more able to incorporate his preschool activities in our daily lives". She also reports greater confidence in her ability to teach her child as well or better than a professional.

Russell and Connolly (1978) reported positive effects of intervention on family functioning. Families demonstrated improved inter-family relationships, and adaptation to their handicapped child.

Changing Nature of Evaluation Research

As we have seen, the primary focus of intervention research to date has been monadic or focused on the individual child or adult (parent). Findings from these studies, however, have contributed to a socioecological perspective that implies a broader scope and a change in focus, and a need for research to include a focus on the interaction of mother and child (Schaefer, 1976).

1. The Importance of Mother/Child Interaction

Studies of mother-child interactions are being used to

identify aspects of this relationship which may be critical to later development. Moore (1977) reviewed three major studies of infant competence and mother-child interaction.

In the first of these Yarrow, Rubenstein, Pederson, and Janowski (1972) studied forty-one low income and seven middle income Black mothers and their babies. Observers rated the inanimate environment, the social environment, and the child's development along a number of dimensions. Evidence from this study indicates that the inanimate environment and the social environment each contribute independently to predictions of infant competence. The characteristic of the inanimate environment that related most consistently to infant development was the variety of objects available to the child. Mother's behaviors also related positively to the child's cognitive development. The variety and level (amount and intensity) of maternal social stimulation correlated with the Bayley Mental Scale. Cognitive motivational infant behaviors including persistence, thoughtfulness, and the repetition of interesting effects were also related to the variety and level of maternal stimulation as well as mother's expressions of positive affect. Positive correlations were also found between mothers' contingent response to distress and Bayley Mental and Motor Scales and to all goal directed behavior. In summary, the authors concluded that mothers and other primary care givers mediate cognitive development not only by providing an interesting variety of inanimate objects, but by becoming socially involved with the infant

as he or she interacts with the environment in a positive, contingent way.

Clarke-Stewart (1973) studied thirty-six first born children and their mothers from black and white low income families. Of interest is the cluster of maternal behaviors designated by Clarke-Stewart as "optimal maternal care" that related most consistently to child competence. These behaviors included maternal warmth, loving care, stimulating and enriching behaviors, such as facilitating their children's involvement with objects in their environment, talk with their child about ongoing activities, and expressing a playful attitude toward their child. "Optimal maternal care" mothers also respond readily to their child's social overtures and to signs of distress. Mothers of more competent infants spend more time interacting with their infants.

White and Watts (1973) studied and compared a group of twenty-two infants and toddlers who were expected to be especially competent at age six (Group A) with nine infants who were expected to be lower in competence (Group C). In comparing the environments of these two groups of children, they found that 'A' children spent more time interacting with their mothers than 'C' children at all ages, and that 'A' mothers engaged in more intellectual (verbal) behavior at all ages. 'A' children asked for more help from mothers, and 'C' children were more clingy.

Ramey et al (1979) found that it was possible to predict a child's later cognitive performance as a result of having

information about the mother's attitudes, behavior, and at home interactions with their children when they are toddlers. They also found that the accuracy of prediction was lowered by the child's participation in an early intervention program (a full day care program) and they concluded participation in an intervention program altered the relationship between maternal characteristics and later development.

Other studies (Beckwith & Cohen, 1975; Bell, 1974; Bell & Ainsworth, 1972; Stayton, Hogan & Ainsworth, 1971) have confirmed the current view that interaction between mother and child and the reciprocal nature of that interaction, is a cornerstone of optimum infant development.

2. The Relationship of Mother - Child Interaction to Early Intervention Programs

The establishment of a satisfying relationship between mother and her handicapped infant is essential to Bromwich's (1976) approach to early intervention. She is critical of what she calls the "infant skills" approach where mothers receive instruction so they in turn can teach their infants sequentially ordered developmental skills. She feels that before this can be done, an affective base must be developed on which the more "cognitive" skills can be built. She has identified maternal behaviors that promote infant development and organized these into six levels. The first three levels are referred to as the affective base and include: (1) mother enjoys being with her infant; (2) mother is a sensitive observer of her infant, reads the baby's behavioral

cues accurately, and is responsive to them; and (3) mother engages in quality and quantity of interaction that is mutually satisfying and provides opportunity for the development of attachment and the beginning of a system of communication. The remaining three levels are more cognitive in nature and provide the mother with the necessary skills and knowledge to provide her handicapped infant with an optimum learning environment. The sixth and final level includes mother <u>independently</u> generating a wide range of developmentally appropriate activities and experiences in familiar and new situations and at new levels of the infant's development. The achievement of this level is crucial if the intervention program is to have enduring effects. The key then, for Bromwich is that the quality of the mother-child interaction has been enhanced and strengthened, and will therefore lead to enduring benefits for the child in the intervention program.

Buckhalt, Rutherford, and Goldberg (1978) point to the need for further analysis of interactions between mothers and their handicapped infants in more typical interactive tasks such as feeding and dressing to support the claim that some change in mother-child interaction is necessary for successful intervention to occur.

> While it remains a useful, but inadequately tested, hypothesis that early intervention in the mother-child interaction is a necessary prerequisite to mitigating delays in the development of language and cognition, a sound observational base is lacking. Additional studies of mother-infant interaction with retarded and non-retarded infants would contribute to this observational base.

3. Mother - Child Interactions and Program Evaluation

The importance of mother-child interaction in the evaluation of intervention programs is tied to the assumption that change in mother - child interaction is a neccessary component of the durability of the program. The "wash out" of initial gains in programs for young disadvantaged children almost led to their total abandonment, and certainly contributed to modification in curriculum design and implementation. The underlying assumption in current programs that begin in infancy in the home with the parent as the main program implementer, is that a change in the mother - child interaction will occur and lead to enduring gains in the child's functioning.

Although this assumption is pervasive throughout the literature, very little objective evidence is presented that substantiates this point of view. This important area has not received the attention it deserves perhaps due to the lack of measurement tools for social, affective, and interpersonal change. Similarly, methods for coding and analyzing observational data lag behind other methods in the social sciences.

In summary, the current review of research evaluating programs for the moderately - severely handicapped young child indicates that most researchers in this area have followed their predecessors in the area of intervention programs for the disadvantaged in using the child's cognitive progress as the primary indicator of program effectiveness. This measure alone seems inadequate as has been pointed out by many researchers (see Zigler & Trickett, 1978 for a discussion of this issue),

due to the fact that it gives limited and short term information about the success of the intervention program. Program maintenance and durability is the critical issue for many researchers (O'Dell, 1974; Koegel, Glahn and Nieminen, 1978; Stokes and Baer, 1977). Unfortunately, these qualities have yet to be demonstrated by many intervention programs. It is vital, however, that this kind of research evidence be provided if intervention programs are to receive continuing community and academic support.

CHAPTER III

RATIONALE AND HYPOTHESES

Rationale for Evaluation Model

It seems clear from the preceding review of the literature, that social scientists do not agree on one single measure as the most definitive in terms of the evaluation of the effectiveness of intervention programs. This, no doubt, reflects the complex nature of these programs and the people they serve. Van Biervliet (1979) lists four groups of people who are effected by program evaluation: (1) persons receiving treatment; (2) persons whose complaints are being remedied by the program; (3) persons who provide tangible and intangible support for the program; and (4) persons conducting the program. The goals of intervention, and hence program evaluation, would differ according to the needs of each of these groups. Evaluations that are abstracted from the laboratory are not sufficient for examining a program designed to effect socially important behavior (Wood, 1975). In order to evaluate these types of programs, researchers will have to draw upon several sources of information, such as developmental norms, consumer surveys, and related professional and governmental agencies, rather than just upon target behavior measurements (Van Biervliet, 1979). The need for a broader approach to the evaluation of social programs is echoed in Zigler and Trickett's argument for the use of a social competence index as a measure of program efficacy. Their conception of a

social competence index subsumes four separate measures of program success: (1) measures of physical health and well being; (2) measure of formal cognitive ability; (3) achievement measure; and, (4) motivational and emotional variables.

In providing a comprehensive model for evaluating the Early Education Program it appears the evaluation objectives should conincide with the program goals and be broad enough to encompass the social significance of the program.

The Evaluation Model

The goal of the Early Education Program is the provision of an effective intervention program for developmentally delayed infants and preschoolers. The broader social significance of the program is that as a result of increased functioning, the individual acquires greater independence, and the opportunity to experience a fuller and more meaningful existence.

An evaluation model that would encompass both the specific program goals, and the broader social context, should therefore examine several aspects of the program's impact.

Component (a) - Impact of the program on the child's functioning. A formal assessment of the child's cognitive functioning will give us information with regard to the child's intellectual progress. Has the Early Education Program been effective in preventing the progressive intellectual decline associated with Down's Syndrome and other types of retardation? To be truly comprehensive, a criterion referenced measure of the child's functioning would also be included. This component, however, was deleted from the current

evaluation because this type of measure is as an integral part of program implementation, and therefore felt to be unnecessary and redundant within the confines of this study.

Component (b) - Impact of the program on the parents' functioning, skills and attitudes. Since the parents are the main consumers of the program (in reality the infants are, but because of their age, they are represented by their parents), feedback from them regarding the effectiveness of the program would be extremely valuable.

Component (c) - Impact of the program on the social-physical environment of the child. What changes are reflected in both the physical and social environment as a result of the intervention process?

Component (d) - An important aspect of the social environment is the behavioral patterns of mother and child, and the interaction between them. Does the child demonstrate the new skills and knowledge he/she has acquired as a result of the intervention program in their everyday activities? That is, do they demonstrate their new skills outside the direct teaching situation? Similarly does the mother use the new skills she has been taught through the Early Education Program to assist her child in everyday situations, outside of the direct teaching paradigm? Further, does the mother-child interaction change as a result of these newly acquired skills on the part of both mother and child. This component of the social environment is particularly significant in view of its assumed relationship to enduring benefits accrued from intervention programs. It is hoped that a change in the

mother-child interaction patterns will support long term changes in the child's functioning. O'Dell (1974) in an article summarizing the training of parents in behavior modification techniques, states that in order for training to be effective, their skills must generalize outside the training situation, and be maintained after training. He continued stating the area of generalization and maintenance in applied behavioral analysis remains a less well developed aspect of technology, and studies need far more emphasis in this area as it must ultimately be the criteria for success.

Anticipated Outcome of Evaluation

The questions to be answered by this study involve the following:

1. Participation in the Early Education Program will result in an increase in the child's cognitive functioning.
2. The Early Education Program will provide the parents with increased skills and confidence in working with their Handicapped infants.
3. Participation in the Early Education Program will result in an increase in those aspects of the physical and social dimensions of the home environment that facilitate cognitive development.
4. The skills taught to the children as a result of participation in the Early Education Program will generalize to situations outside the direct teaching situation.
5. The skills taught to parents as a result of participation

in the Early Education Program will generalize to situations outside the direct teaching situation.

6. Participation in the Early Education Program will result in a change in the mother/child interaction.

CHAPTER IV

METHOD

Design

Classical experimental design with random assignment of subjects to a control and a treatment group affords greater control of confounding variables. Unfortunately, in this study use of a control group was precluded by the restricted population (mothers with clearly identified handicapped infants in the Early Education Program) from which our sample was drawn. Further, and more importantly control group use was not possible for ethical reasons (withholding of service is not a viable alternative). In view of these difficulties a quasi-experimental (Campbell and Stanley, 1966) design was used. The particular quasi-experimental design to be used was a time series or repeated measures design. The essence of this design is periodic measurement of the dependent variable in some group or individual, and the introduction of an experimental change (independent variable) into this time series of measurements, the results of which are indicated by a discontinuity in the time series (shown in Figure 1). Again from Stanley and Campbell (1966) the most serious flaw of the design in terms of internal validity is the failure to control history; that is, some rival hypothesis exists that not the treatment but some other simultaneous event

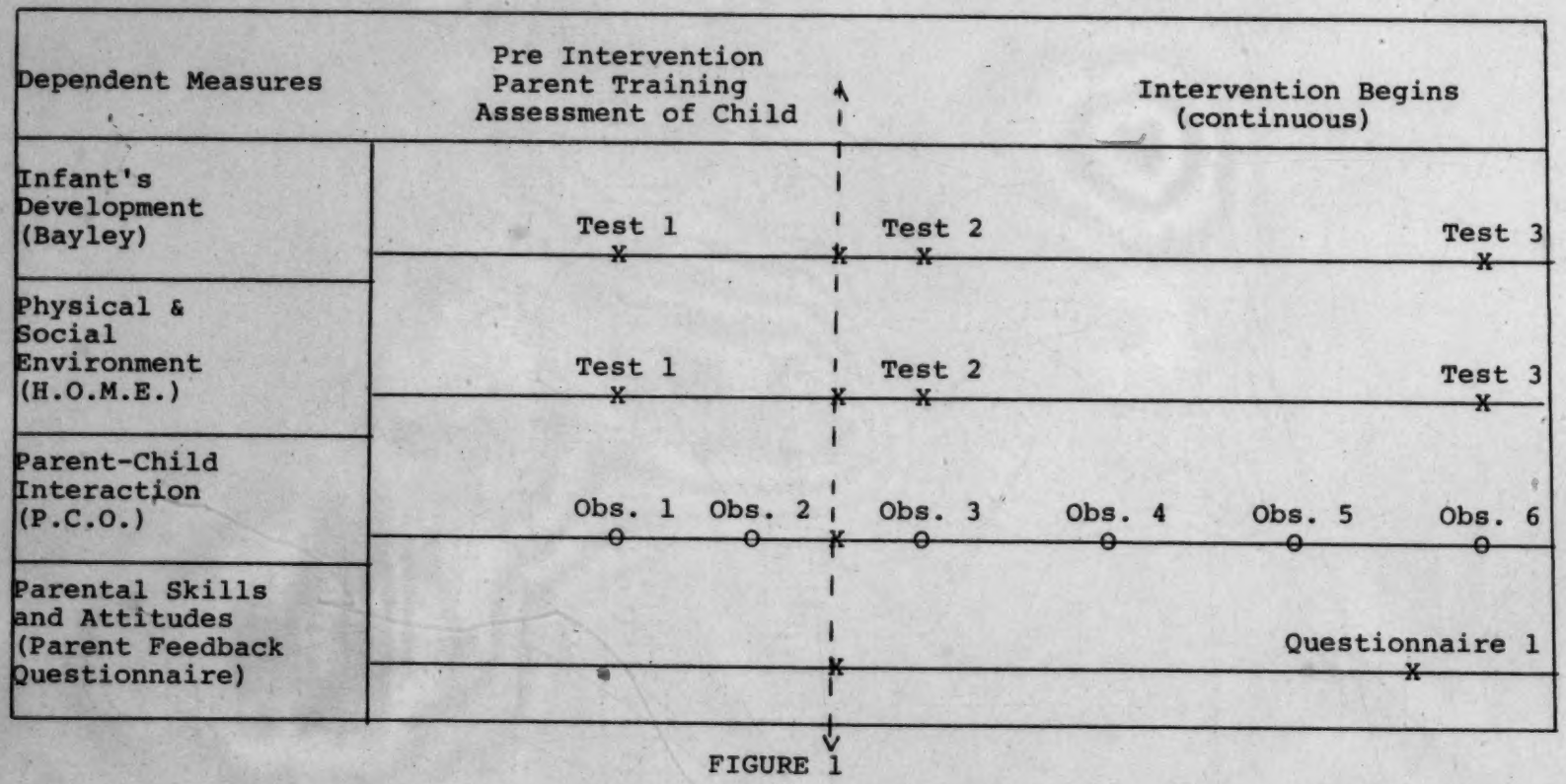


FIGURE 1

Evaluation of Early Intervention

caused a change in the dependent variables. In the present study, for example, it could be claimed that the children's progress resulted from a specific biological occurrence, or that the mother's behavior changed as a result of reading a book on how to teach your handicapped baby.

With regard to external validity, limitations of this design become more significant. The researcher must be aware of limitations due to the interaction effect of repeated testing, and selection of the experimental variable in the more general application of results. Another issue with time series designs is the specification in advance of both the experimental variable and the expected time relationship between the introduction of the experimental variable and the manifestation of the effect. As the time between treatment and effect increases, so does the plausability of effects from extraneous historical events.

In this study many of the criticisms of time series designs can be eliminated by the process of comparing each mother-infant pair individually, (as in multiple baseline designs). Due to individual differences in program implementation, the various teaching strategies were implemented by individual mothers at different points in time. Close communication with the home teacher regarding the implementation of both specific behavioral objectives and specific teaching techniques allow an assessment of the program on both individual mother-child pairs and the total group. In other words, the demonstration of the treatment effect at different times on each of the parent-child pairs serves as a replication of the

experiment in different situations, a necessary event if we are to establish the effectiveness of the current intervention program.

Sample

The sample consisted of six mother-infants dyad involved in the Early Education Program, at Mayfield School, Edmonton Public School Board, Edmonton, Alberta, Canada. The subjects were obtained through written solicitation of parents on the Early Education Program waiting list. Of nine families contacted, six agreed to participate in the present study. There were four male infants, and two female infants, with a mean age of 8.5 months at the initiation of the study. All infants had been identified as developmentally delayed, with five of the six children having Downs's Syndrome. The families represented a broad spectrum of educational and income levels. Descriptive characteristics of the six families are shown in Table 2. None of the families in the present study had been involved in a prior intervention program.

Instruments

1. The Bayley Scales of Infant Development

The instrument selected to assess the functioning level of the subjects was the Bayley Scales of Infant Development. The Bayley is an individually administered, standardized infant assessment test. Composed of two scales, the mental scale focuses on early sensory-perceptual responses, activities

TABLE 2

FAMILY CHARACTERISTICS

	Parents				Children	
	Parents Education	Number of Children	Two Parents	Income Level	Date of Birth	Health Problems**
Family 1	University Degrees	3	Yes	$25-$30,000	Mar. 18/79	No
Family 2	Completed Grade 12, Some College	3	No	below $10,000	July 24/78	No
Family 3	Univeristy Degrees	2*	Yes	above $20,000	Mar. 23/79	Yes
Family 4	Grade 10 Grade 12	2	Yes	$20-$25,000	Mar. 13/79	Yes
Family 5	University Degree Post Secondary	2	Yes	$30,000 +	Feb. 25/79	No
Family 6	Grade 9 Grade 12	4	Yes	$20-$25,000	May 18/79	No

* Foster Child

** Health problems severe enough to require hospitalization.

associated with problem solving, efforts at verbal communication, and early attempts at generalization and classification; while the motor scale provides a measure of body control and gross and fine motor skills (Bayley, 1969:3). Results for both scales are reported as standard scores: the mental scale is termed M.D.I. (Mental Development Index); and the motor scale is termed P.D.I. (Psychomotor Development Index).

The Bayley was chosen because it was carefully standardized, with high validity and reliability, and broad coverage of the behavioral repetoire of infants. Collard (in Buros, 1975) calls it "by far the best measure of infant development available today".

2. The Parent Feedback Form

The impact of the program on the parent's functioning was assessed using a somewhat open ended questicnnaire developed by the present author. This self report instrument provided verbal and written feedback from parents regarding their participation in the Early Education Program (see Appendix B).

3. The Home Observation for Measurement of the Environment Inventory (H.O.M.E.)

The H.O.M.E. was selected to assess the impact of the Early Education Program on the social and physical environment of the infant. The H.O.M.E. combines informal observation (2/3 of items) and structured interview (1/3 of items) to provide a description of the child's model experience. This instrument has six subscales which reflect various aspects of the child's daily environment: (1) emotional and verbal responsitivity of the mother; (2) avoidance of restriction

and punishment; (3) organization of the physical and temporal environment; (4) provision of appropriate play materials; (5) maternal involvement with the child; and (6) opportunities for variety in daily stimulation. Results from all scales are reported as raw scores, as well as percentile rankings.

The H.O.M.E. was chosen because it is one of the few available measures that describes the daily environment of the young infant. Further, studies have found the H.O.M.E. to be positively correlated with later cognitive functioning (Elardo, Bradley and Caldwell, 1975; Bradley and Caldwell, 1976). As well, it has been found to discriminant between diverse populations in predictable ways (Hollenbeck, 1978).

4. Parent-Child Observation Schedule

The Parent-Child Observation Schedule was devised to reflect more detailed aspects of both the mother and the child's behavior, as well as the interaction between these two.

As Clarke-Stewart (1973) points out the study of mother-child interaction is beset by problems of method. Strategies of data collection not involving direct observation are not sensitive to the behavioral dynamics of intervention and may even be misleading since they often involve selective recall, difficult discriminations and syntheses, and possible distortions on the part of mother or researchers. Direct observation of mother-child interaction in their natural environment although preferred, also has problems, including lack of standardization in natural environments and possible distorting effects of the presence of an observer. Selecting

variables to observe, and a method of measuring them are also difficult tasks.

The present study will attempt to avoid many of these difficulties by following many of the carefully developed procedures and measurement techniques outlined by Clarke-Stewart in her study of mother-child interactions.

Although we had originally intended to use Clarke-Stewart's observation categories, containing 23 infant behaviors and 26 mother behaviors, we were unable to obtain adequate inter-rater reliability to provide meaningful results. As a result, the original 49 behaviors were reduced by clustering, to eight infant behaviors and nine mother behaviors. Some behaviors were added to the mother behavior clusters to include the specific aspects of the early education programs teaching paradigm (see Appendix C). Behaviors for mother and child were recorded concurrently by an observer in the home setting.

Setting: Home Program, Early Education Program

The home based component of the Early Education Program serves children aged 0 to 2½ years. The children are taught in their homes by their parents with support provided by weekly visits from a home teacher (a staff member from the Early Education Program). The home teacher provides the parent with the necessary information regarding assessment procedures, curriculum implementation and development, data recording, and teaching techniques.

1. Parent Training

Direct Teaching Model

Parent training lasts approximately six to eight weeks,

with modelling, behavioral rehearsal, and video tape used by the home teacher to teach the five levels of program implementation in the direct teaching model (see Table 3). The direct teaching model involves a systematic method of structuring the learning environment and the gradual fading of prompts. This model is most effective using a written program and data collection format. Parents are trained to use the direct model for 10 to 15 minute sessions each day.

Parent training is a three step program which begins with an overview of the teaching formats, and an explanation of how assessment indicates where to begin instruction. Parents are given a behavioral objective assessed at Level 5. An objective assessed at level 5 would not be taught but placed on a maintenance program. The home teachers instruct the parents in the use of the maintenance program and data collection procedure. This program is left with the parents for one week and reviewed by the home teacher the following week before beginning step two of the training program.

The second step in parent training required teaching towards an objective which had been assessed at Level 3. This step provides concentrated practise using verbal and physical prompts (Levels 3 and 4). The parents are taught how to fade the amount of prompting from trial to trial. The data recording procedure was also introduced and used at this stage. If the child attained Level 5 mastery, the behavior would be reviewed and maintained as in the first step of the training program.

TABLE 3

FIVE INSTRUCTIONAL LEVELS OF THE DIRECT TEACHING MODEL

Teaching Levels	Components
Level 1	1. Instruction 2. Model* 3. Verbal prompt 4. Physical prompt 5. Physical guidance-Level 1
Level 2	1. Instruction 2. Model* 3. Verbal prompt 4. Physical prompt 5. Physical guidance-Level 2
Level 3	1. Instruction 2. Model* 3. Verbal prompt 4. Physical prompt
Level 4	1. Instruction 2. Model* 3. Verbal prompt
Level 5	1. Instruction 2. Model*

* May or may not be included depending upon the terminal behavior in the program.

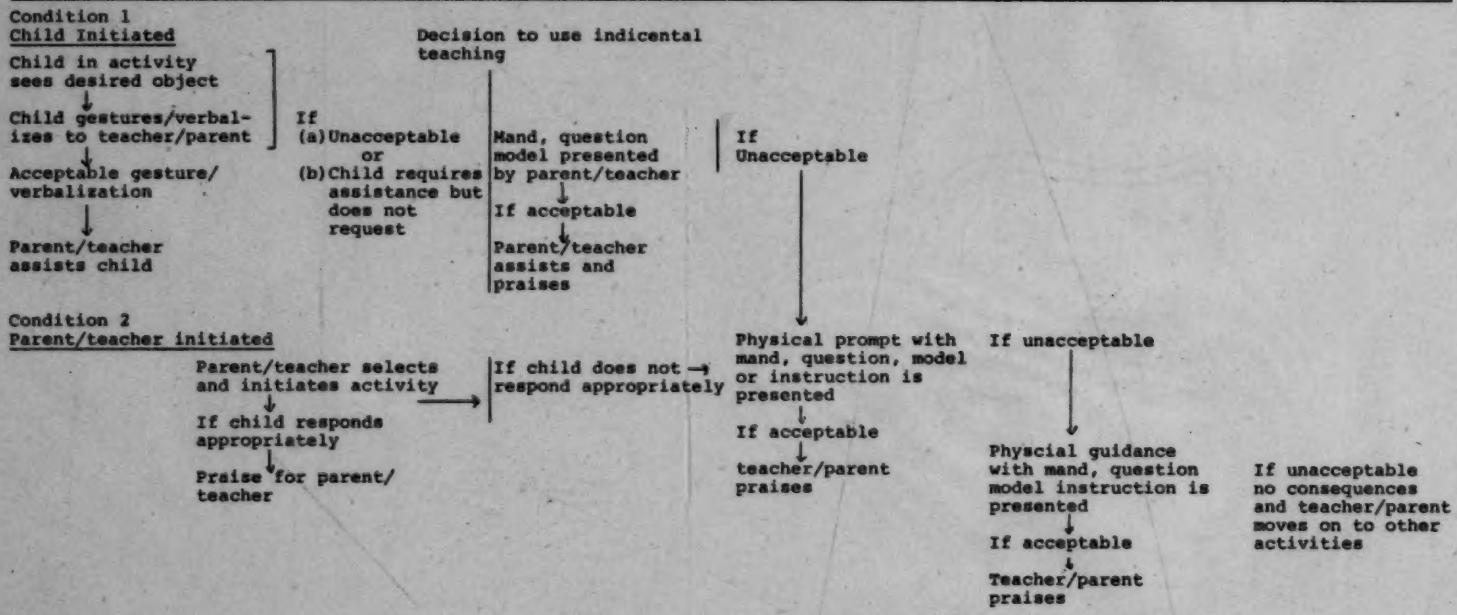
The third and final step requires the parent to implement a teaching program for an objective assessed at Levels 0 or 1. This requires the use of minimum and maximum guidance. This step incorporates a cumulative review of the previous steps. Following mastery of these direct teaching procedures, the parents are taught the incidental teaching method which supplements and extends the child's learning into his natural environment.

Incidental Teaching Model

Although the regular teaching sessions are very important, it is vital that learning is not restricted to these brief periods. Parents or significant others can contribute much to child's learning during the course of normal activities. Incidental teaching refers to a number of techniques that can be used informally to optimize "teachable moments" during the child's day. Through incidental procedures parents can encourage the child to practise, develop and generalize the use of new skills and concepts (Shatz, 1980). Additionally it allows parents to structure their interaction with their child in such a way that learning opportunities are maximized. This procedure also gives the parents confidence and techniques that can be readily used in dealing with their handicapped child. Although informal, the incidental teaching approach is not haphazard. Kysela et al (1979) describes a decision making mechanism for teaching incidentally (shown in Table 4). The incidental teaching process involves 3-steps which form an abbreviated version of the levels of prompting used in the direct teaching model. An increased amount of assistance is provided at each step. These situations can be initiated

TABLE 4

INCIDENTAL TEACHING DECISION-MAKING MODEL


Condition 1
Child Initiated
Child in activity sees desired object
Child gestures/verbalizes to teacher/parent
Acceptable gesture/verbalization
Parent/teacher assists child
If (a) Unacceptable or (b) Child requires assistance but does not request
Decision to use indicental teaching
Mand, question model presented by parent/teacher
If acceptable
Parent/teacher assists and praises
If Unacceptable
Physical prompt with mand, question, model or instruction is presented
If acceptable
teacher/parent praises
If unacceptable
Physcial guidance with mand, question model instruction is presented
If acceptable
Teacher/parent praises
If unacceptable no consequences and teacher/parent moves on to other activities
Condition 2
Parent/teacher initiated
Parent/teacher selects and initiates activity
If child responds appropriately
Praise for parent/teacher
If child does not respond appropriately

by parent or child, and are particularly useful in facilitating the development of effective language.

2. Program Implementation

Following completion of the training program, the parent is ready to begin program implementation using the direct teaching format. The home teacher continues to visit the family on a weekly or biweekly basis to assist in selecting new behavioral objectives, and improving teaching procedures. She is also available for consultation with regard to any problems that arise concerning teaching strategies, program development or implementation, data collection or any general concerns that may arise regarding the intervention process. Following successful implementation of a number of programs using the direct-teaching format, the incidental teaching format is introduced to the parents. The parent now has two different, but complementary teaching strategies for stimulating their child's development.

Procedures for Data Collection

1. Pretraining and reliability

(a) Bayley Scales of Infant Development. The examiner was a graduate student from the Faculty of Family Studies, with experience working both with young children and handicapped individuals. Practice sessions in the administering of the Bayley Scales were completed using infants of varying ages. One of the project supervisors observed a practice session as a means of establishing reliability.

(b) H.O.M.E. The H.O.M.E. interviewers were two graduate students with previous interviewing experience. They became familiar with this instrument through practise on five mother-child pairs (primarily friends of the researcher). Reliability was calculated by totalling the number of agreements and dividing by agreements plus disagreements. Reliability on the practise mother-child dyads ranged from 81% to 96%, with a mean reliability of 91%.

(c) Parent-Child Observation Schedule. The observation data was collected by two trained graduate students. Training included observations of video-taped mother-child interaction, as well as observation of live mother-child dyads. Prior to the onset of data collection, interobserver reliability was established by having both observers code the same mother-child dyad (live and video) simultaneously. The degree of reliability was then calculated by totalling the number of agreed mother and child behaviors for the observation period and dividing by the number of agreements + disagreements for this same period. Mean reliability for mother behaviors during training was established at 62%, while mean reliability for baby behaviors was established at 53%.

2. General procedures for data collection

A project co-ordinator (the author) was responsible for scheduling the various components of the study. An informal visit was made to each family prior to the onset of data

collection explaining the nature and purpose of the research, and hopefully ensuring their co-operation during the entire period of the study. Visits were always scheduled so that the family was minimally inconvenienced. The parents were encouraged to phone the project co-ordinator when they had concerns or questions regarding the study.

3. The Bayley Scales of Infant Development

The test was administered with the parent/care-giver present. In fact, she/he was actively utilized in presenting a number of the test materials. An example of parent/care-giver involvement would be in administering Motor Scale item 25 - "attempt to secure pellet". Since the best test performance possible on the part of the infant was desired, the parent/care-giver was apt to be more successful at encouraging the infant to attend to the pellet and then to attempt to secure it.

Although there is some flexibility allowed in the order of presentation of groups of test items, the items basically are arranged sequentially in terms of their developmental difficulty and complexity. Every effort was made to explore the full range of each infants capabilities without tiring him or her unneccessarily. The time required for the actual administration of the Bayley Scales ranged from thirty to fifty minutes although the time spent in the home was longer than that period. After the test was completed, the examiner endeavored to make sure both infant and parent/care-giver were relaxed and comfortable about the test experience.

The Bayley Scales were administered three times at three

month intervals. Procedures and examiner were the same throughout the testing period.

4. Parent Feedback Questionnaire

The questionnaire was mailed out to all participants at the end of the study. Within one week of receipt of this document, the author contacted the parent(s) and arranged a mutually agreeable appointment time to further discuss the contents of the questionnaire. The appointments were all arranged in the families homes and the discussion of the questionnaires also served to provide some closure to the research project.

5. H.O.M.E.

As previously described the H.O.M.E. involves both informal observation of the mother-child dyad and a standard interview format. The questions are established in a binary form, that is, questions are scored either yes or no. The interview was done at home, at a time when the infant was awake and active. An attempt to reduce possible distortion due to the presence of the interviewer was made by always having the same interviewer visit the same families. The H.O.M.E. was administered three times at three month intervals to coincide with the administration of the Bayley.

6. Parent-Child Observation Schedule

Data was collected using a time sampling techniques. Trained observers in the home observed mother-child interaction for three ten minute segments (composed of five two minute intervals) of natural mother-child interchange: feeding, dressing, and free play. The order of these activities was

not specified but was set by mother's needs and the infant's schedule. The mother was encouraged to interact as she normally would during these activities. The observer sat near the baby, positioned to give a clear view of mother and child. Behaviors were recorded concurrently for mother and baby for each ten second interval during the observation period in a stenographic note book. A tone* just audible to the observer indicated the end of each ten second interval, and at this time the observer dropped to a new line in her/his note book. Behaviors were recorded continuously for two minutes (12 intervals) and for a maximum of five two minute segments per activity. Although it was desirable to obtain five two minute segments per activity during each session, in reality feeding and changing rarely took the full ten minutes. Depending on the infant or the mother these two minute segments were not always uninterrupted.

The observational data was collected at three-four week intervals over a period of approximately nine months (October-June). Again, an attempt was made to reduce possible distortion due to the presence of the observer by having the same observer always visit the same families.

Periodic reliability checks were carried out during the entire data collection period by having both observers visit the same family and do a concurrent observation. Inter-observer reliabilities are shown in Appendix D.

* The tone of approximately 410 Hertz was produced by a portable cassette using pre-recorded tapes.

CHAPTER V

RESULTS

Question 1: Participation in the Early Education Program will result in an increase in the child's cognitive functioning.

The childrens' cognitive functioning as measured by the Bayley Scales of Infant Development, was compared with their chronological age. The childrens' mean Bayley scores (in months) for both mental and psychomotor development are contrasted with their mean chronological age at each of the three assessment times and represented graphically in Figure 2. Increases in both mental and psychomotor development can be observed over the course of the intervention. The average gain in mental performance was slightly higher than the gain in the psychomotor area.

In terms of relating the observed increase in the childrens' functioning to the time spent in intervention, Bagnato and Neisworth (1980) have proposed an Intervention Efficiency Index (I.E.I.). The I.E.I. is a measure of both child progress and program effectivness and is based on two major variables:

(a) an index of development gain (pretest and post-test) expressed in months, and

(b) length of participation in intervention expressed in months. A ratio of developmental gain for each month of participation in intervention is generated. Thus the I.E.I. may be expressed as:

CHILDREN'S PROGRESS REFLECTED BY BAYLEY SCALES OF INFANT DEVELOPMENT

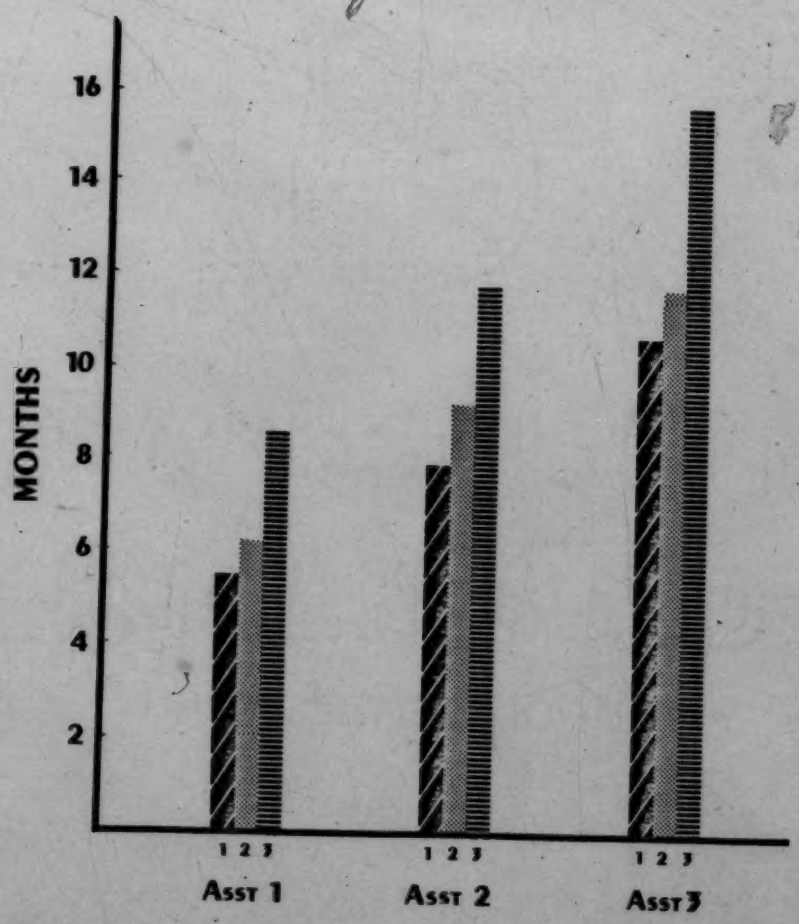


FIGURE 2

developmental gain (in months)/time in intervention (in months) = Intervention Efficiency Index, and becomes a measure of program effectiveness as well as child progress. Using the Bayley scores obtained at the beginning of intervention, and at the termination of the evaluation project nine months later, I.E.I.'s were calculated for the current group of six infants. The following individual and group indexes were obtained:

(1) an I.E.I. for each child in the area of mental development, and a mean I.E.I. for the group in this area.

(2) an I.E.I. for each child in the area of psychomotor development, and a mean I.E.I. for the group in this area.

(3) an overall I.E.I. for each child, and a mean I.E.I. for the group. This is displayed in Table 5.

When the I.E.I.'s are calculated by adjusting the scores for time spent in the program, the mean intervention efficiency index for the mental performance area becomes .75, while the mean intervention efficiency index for psychomotor performance becomes .66. The overall efficiency index is .71. In other words, for every four months spent in the program, the children demonstrated an average developmental gain of three months in the two areas measured by the Bayley. The childrens' individual I.E.I.'s in psychomotor development ranged from .43 to 1.00, while in mental development the range was from .50 to 1.14. This is represented in Table 5 as well.

TABLE 5

BAYLEY DEVELOPMENTAL PROGRESS TRENDS REFLECTING RATE OF SKILL ACQUISITION, BETWEEN SEPTEMBER, 1979 AND JUNE, 1980

Child	Age in Months at Pretest	Months in Program	Mental Development Index (MDI) (in months)				Psychomotor Development Index (PDI) (in months)				Mean Gain Across Development Areas (in months)	Mean IEI*
			Pre	Post	Gain	IEI*	Pre	Post	Gain	IEI*		
01	09	6	9	12	3	.50	8	14	6	1.00	4.5	.75
02	08	7	6	12	6	.86	6	11	5	.71	5.5	.79
03	15	7	10	18	8	1.14	9	14	5	.71	6.5	.93
04	07	9	5	12	7	.78	5	10	5	.55	6.0	.67
05	07	7	3	7	4	.57	3	6	3	.43	3.5	.50
06	05	8	4	9	5	.63	3	8	5	.63	5.0	.63
N=6	Average Age=8.5	Average months = 7.33	Average MDI Gain = 5.5			Mean IEI =.75	Average PDI Gain = 29/6 = 4.83			Mean IEI =.67	Average Development Gain/Child = 5.17 months	Mean IEI =.71

* Intervention Efficiency Index

In comparing the I.E.I.'s between assessment intervals (see Figure 3) we see a very slight increase in the efficiency of the intervention program in terms of psychomotor development in the second half of the evaluation period; conversely, we see a drop in the effectiveness of the intervention in terms of the childrens' mental development in the second half of the evaluation period. In both periods, however, the program seems more effective in promoting the children's mental development.

Question 2: The Early Education Program will provide the participating parents with increased skills and confidence in working with their handicapped infants.

This question was an attempt to obtain direct feedback from the parents regarding their involvent in the program, a kind of consumer satisfaction rating. The experimenter was interested to learn if the parents felt the Early Education Program had made a change in the way they related to their infants, - and if so, in what way. The experimenter also wanted to know if parents were satisfied with their child's progress as a result of program involvement, and if they felt the program was more effective in certain developmental areas than others. Further, the experimenter wanted to find out if parents reported using the specific teaching techniques taught by the Early Education Program in their day to day interactions with their infants.

The information was collected through the use of the Parent Feedback Questionnaire (see Appendix B). The

COMPARISON OF INTERVENTION EFFICIENCY INDEX BETWEEN ASSESSMENT INTERVALS (BAYLEY SCALES)

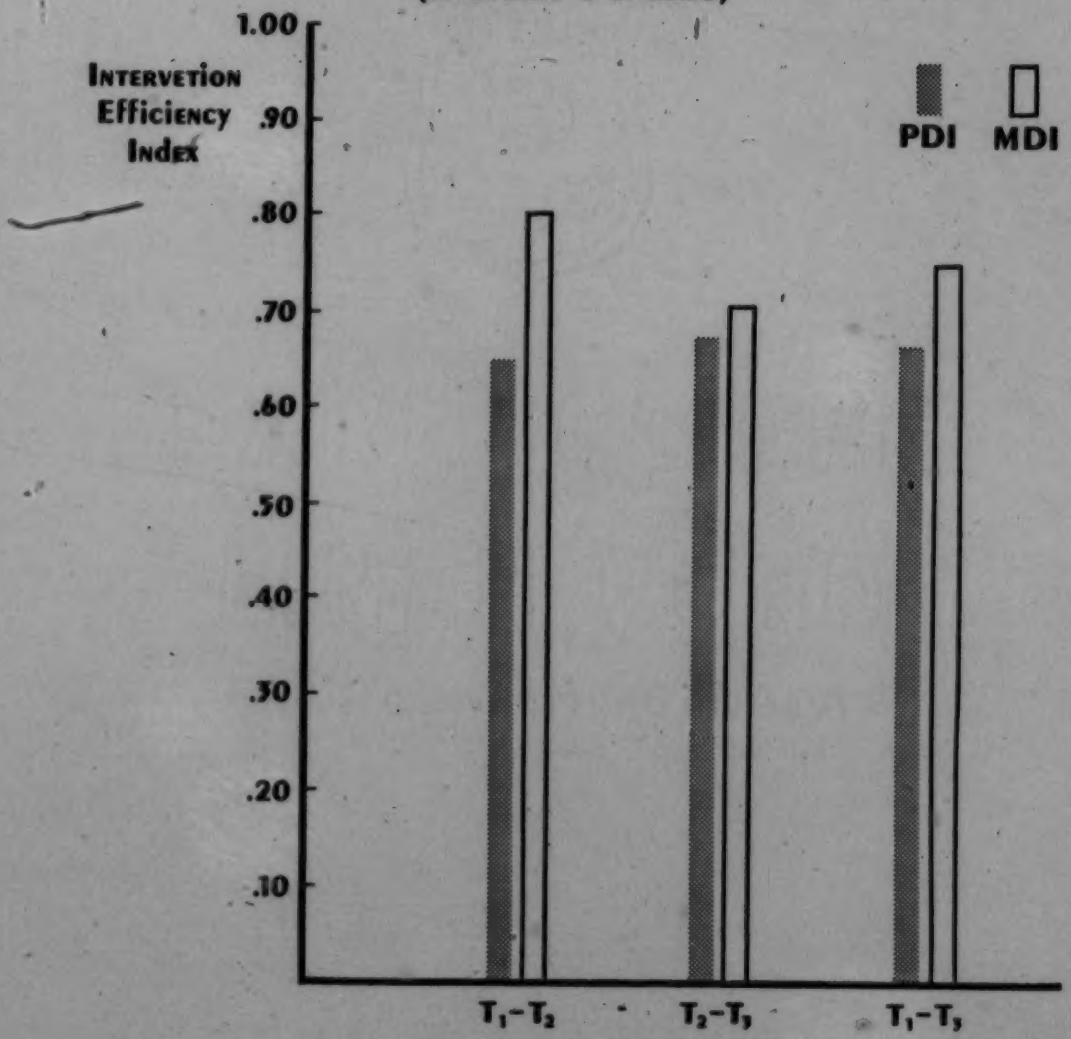


FIGURE 3

questionnaire was mailed out to the families, and collected a week later by the experimenter. At the time the questionnaires were collected, the experimenter interviewed the mothers regarding their written responses to the questionnaire.

All families reported that their children had shown some degree of progress in the developmental areas included in the Early Education curriculum.

Four/six mothers felt their child had shown marked cognitive improvement as a result of participation in the Early Education Program. The remaining two mothers felt that their child had shown some improvement in this area.

In the self help area, two mothers felt this question was not appropriate to their child's current level of development. Of the remaining four parents, three felt their child had shown some improvement while one felt their child had shown marked improvement.

Four of the six parents felt that their child had demonstrated some improvement in the motor area as a result of participation in the program, while two felt their child had shown marked improvement.

In the language area, five of the six mothers felt their child had shown some improvement, while one mother felt that her child had shown marked improvement.

Three of the six mothers felt their child used his/her new skills in everyday activities a lot while the remaining three felt this occurred some of the time.

The parents' comments regarding their childrens' development are summarized in Table 6.

TABLE 6

CHILD PROGRESS REPORTED IN PARENT FEEDBACK QUESTIONNAIRE

Area of Development	A	B	C	D	E
Cognitive	4/6	2/6	-	-	-
Self Help	1/6	3/6	-	-	2/6
Motor	2/6	4/6	-	-	-
Language	1/6	5/6	-	-	-
Generalizes Skills to Everyday Activities	3/6	3/6	-	-	-

Key	
A	Marked Improvement
B	Some Improvement
C	Little Improvement
D	No Improvement
E	Not Applicable

With regard to their own skills, 67% of the mothers (4/6) reported feeling very confident about their ability to handle their handicapped infants as a result of their participation in the program. Two mothers felt more confident than before. Fifty percent of the mothers reported being very optimistic about this child's ability, while 50% felt more optimistic. One mother comments, "my expectations are more appropriate". These results are shown in Table 7.

All of the mothers reported handling this child differently from other children in the family. The major differences centered around the child's cognitive development. Mothers reported "teaching him more"; "constantly using learning principles"; "information presented takes longer and more explanation".

Similarly, of the four mothers who felt they had changed their handling of their child as a result of participation in the program, all reported changes with regard to expectations of their child's development: "push him more"; "more aware of his potential, feel he can do more"; "more aware of significance of stimulation". Two mothers reported increased physical contact: "more rough housing"; "more physical contact". One of the mothers who did not feel she had changed her management of her infant stated that because her child was so young when he had begun the program, she had always treated him the way the program suggested. She reported her role was different with this child: she was the initiator rather than the guide for her

TABLE 7

PARENTAL PROGRESS REPORTED IN PARENT FEEDBACK QUESTIONNAIRE

Area of Development	A	B	C	D
Confident	4/6	1/6	1/6	-
Optimistic	4/6	2/6	-	-

Key
A Very
B More
C As
D Less

child's activities. As well, all activities were encouraged with this child, whereas with her other children, this total acceptance was not always true.

All mothers reported using the Early Education teaching strategies "a lot" in their everyday interactions with their infants.

Five mothers reported that other family members were involved in implementing the Early Education Program, with father, and siblings cited in three out of five instances. Also included were grandmother (1), babysitter (1), and close friend (1).

What mothers found most difficult about the program centered around recording data (four of six) and finding and/or organizing time for direct teaching (two of six). One parent disliked the abbreviated language format used.

What parents enjoyed most included: "the provision of a structured and sequenced way to interact with their child"; "seeing the results - it truly works!"; "time spent alone with child"; "home visits from someone outside the family who is supportive and objective".

Suggestions for improving the program included: increased support services (physio and speech therapist); more involvement with the family unit as a whole; use of other teaching mediums (music, art); more frequent group workshops (especially motor); no waiting lists for new families. (In this regard, one parent suggested using other parents as part of the support system.) All parents

were unanimous in their intention to continue with the program next year.

Question 3: Participation in the Early Education Program will result in an increase in those aspects of the physical and social dimensions of the home environment that facilitate cognitive development.

The total H.O.M.E. scores, as well as the individual subtest scores at each assessment are depicted for each family in Table 8. Similarly, the total scores at each assessment for the six families are shown in Table 9. It will be noticed that two of the families obtained the maximum score possible on this instrument (one family scored one short of maximum as they did not have a pet) on each of the three assessments. This is not inconsistent with my knowledge of these particular families. It must also be remembered that the H.O.M.E. was initially designed for use with low income, deprived families in the United States, where the extremes of environmental circumstances are much more pronounced than in Canada. Further, as Stevenson and Lambe (1979) point out the H.O.M.E. may be too gross and insensitive to reveal individual differences among middle class homes and mothers.

In interpreting the H.O.M.E. scores, the scores from subtests I, IV, and V for each of the four remaining families are shown graphically in Figures 4 and 5. These particular subtests are portrayed for two reasons: (1) they show the most change of six subtests, and (2) they represent

TABLE 8

HOME OBSERVATION FOR MEASUREMENT OF THE ENVIRONMENT

	Asst. #1	Asst. #2	Asst. #3	Net Change
Family 01	44	44	44	n/c
Family 02	45	45	45	
Family 03	33	33	40	+7
I	8	10	11	+3
II	7	6	7	n/c
III	6	4	6	n/c
IV	8	7	9	+1
V	3	5	6	+3
VI	1	1	1	n/c
Family 04	37	40	44	+7
I	9	11	11	+2
II	8	8	7	-1
III	5	3	6	+1
IV	6	9	9	+3
V	6	6	6	n/c
VI	3	3	5	+2
Family 05	23	18	29	+6
I	8	4	7	-1
II	6	6	5	-1
III	5	4	4	-1
IV	2	2	8	+6
V	1	0	5	+4
VI	1	2	0	-1
Family 06	28	37	37	+9
I	5	10	9	+4
II	6	6	6	n/c
III	6	6	5	-1
IV	6	7	9	+3
V	4	6	6	+2
VI	1	2	2	+1

I Emotional and Verbal Responsivity of Mother.

II Avoidance of Restriction and Punishment.

III Organization of the Physical and Temporal Environment.

IV Provision of Appropriate Play Materials.

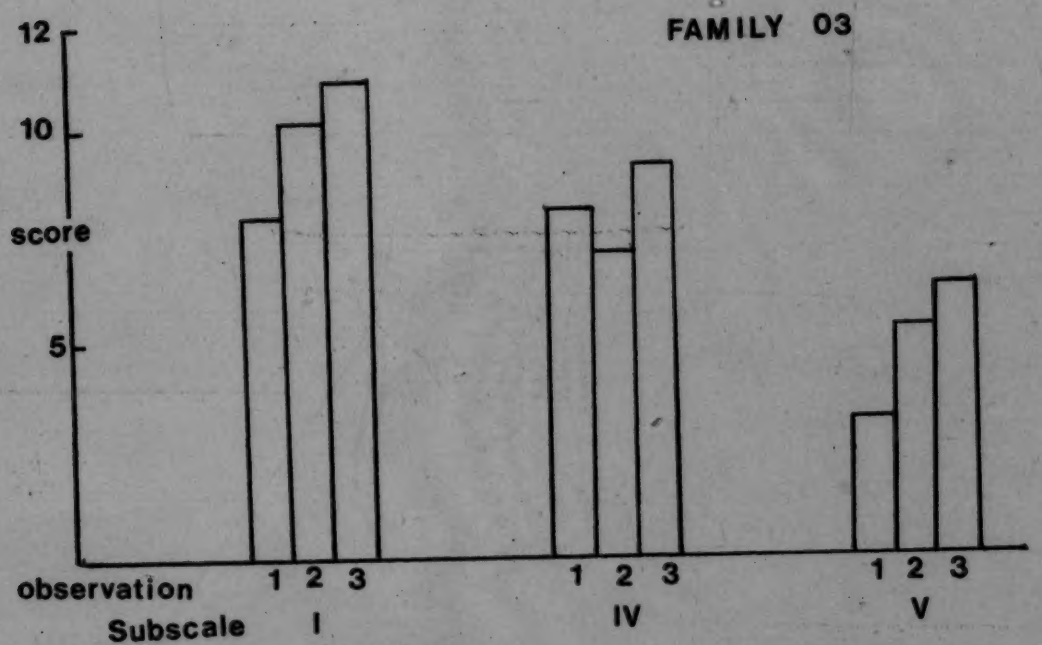
V Material Involvement with Child.

VI Opportunities for Variety in Daily Stimulation.

TABLE 9

TOTAL H.O.M.E. SCORES

	Asst. #1	Asst. #2	Asst. #3
Family 1	44	44	44
Family 2	45	45	45
Family 3	33	33	40
Family 4	37	40	44
Family 5	23	18	29
Family 6	28	37	37
Mean Score	$\bar{X}$ = 35	$\bar{X}$ = 36	$\bar{X}$ = 40



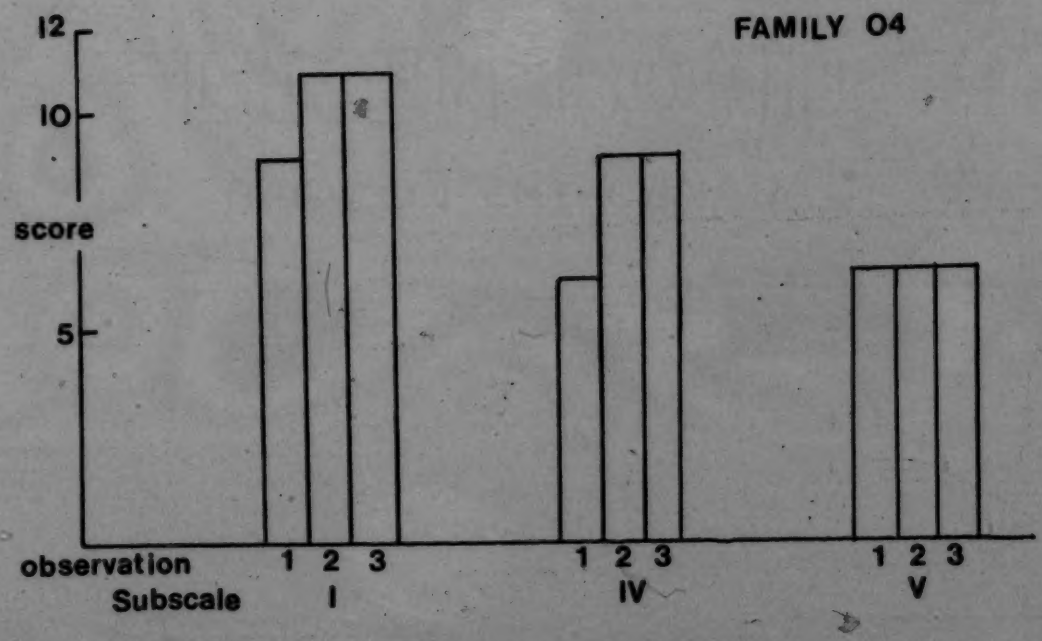
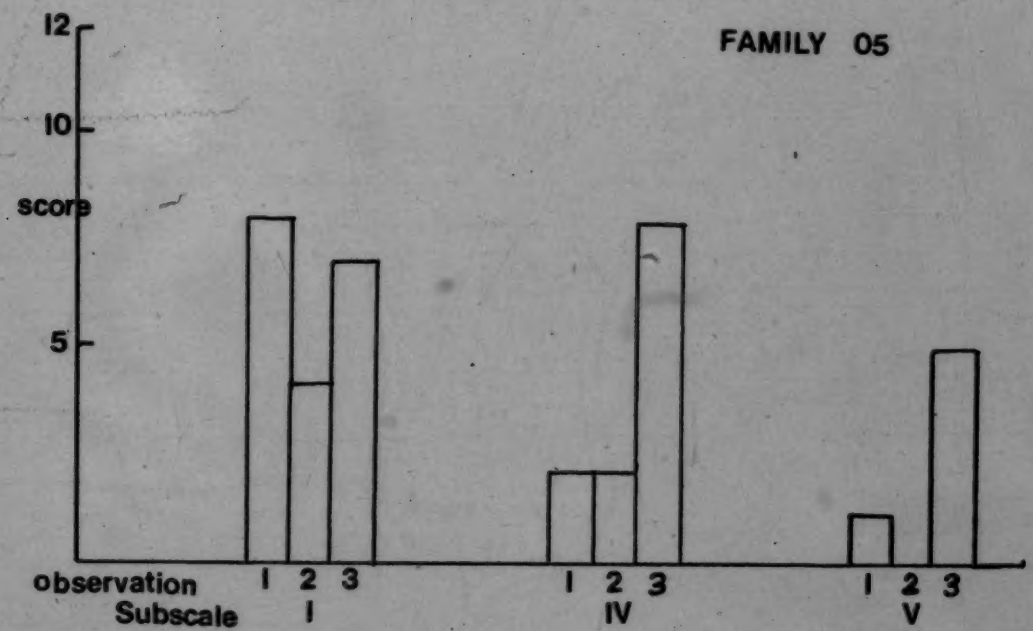


FIGURE 4 H.O.M.E. SCORES OVER INTERVENTION PERIOD



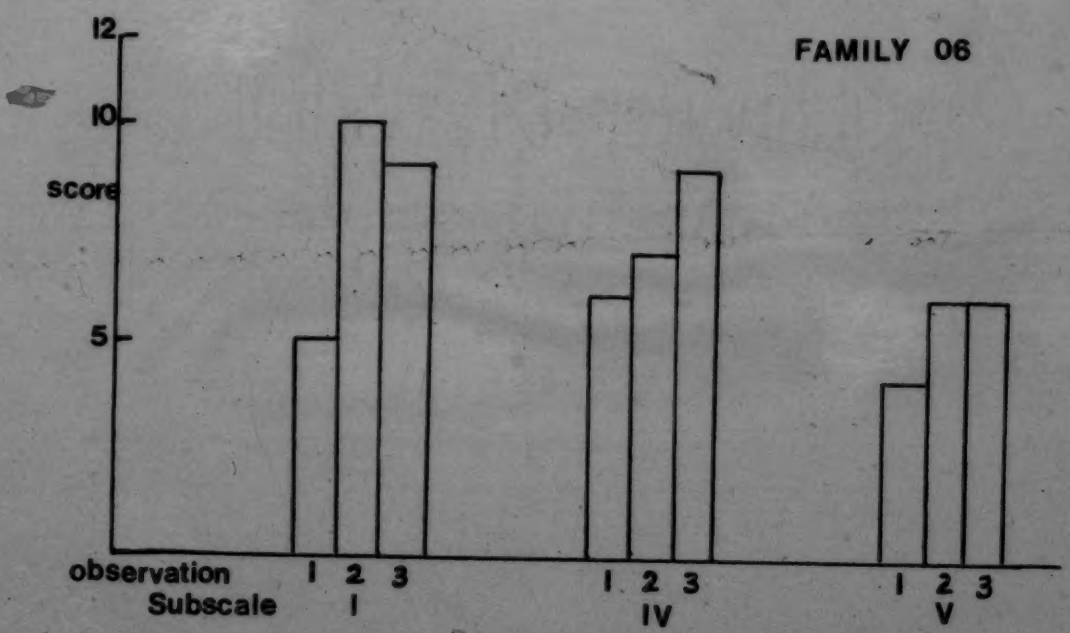


FIGURE 5 H.O.M.E. SCORES OVER INTERVENTION PERIOD

the subtests most often cited as contributing significantly to children's later cognitive development. Bradley and Caldwell (1970), authors of the H.O.M.E., felt that Subscale IV is most strongly related to cognitive development, while IV and V seem to work together and have both been found to be good predictors of children's development. Stevenson and Lamb (1970) found that scores on Subscale I accounted for a positive relationship between the H.O.M.E. and infants' initial sociability score. When scores on Subscale I were partialed out, there was not longer a significant relationship between H.O.M.E. scores and initial sociability (Stevenson and Lamb, 1979).

We see in each family an increase in all three of the subtests (with the exception of Subscale I in family 5, and Subscale V in family 4). This relationship was investigated using Friedman's rank test for correlated samples (Ferguson, 1976). Unfortunately none of the increases noted are statistically significant.

Spearman's rank order correlations were calculated between the Bayley scores (MDI and PDI) and the Intervention Efficiency Indices for both MDI's and PDI's, at Assessment 1 and Assessment 3 (Ferguson, 1976). The results are shown in Table 10. Significant correlations were found between the children's mental development index and their scores on the H.O.M.E. at Assessment 1, and the children's psychomotor development and their scores on the H.O.M.E. at Assessment 3. None of the correlations of the I.E.I. and the H.O.M.E.'s are significant, although the correlation between the initial I.E.I. for psychomotor development and H.O.M.E. 1 approaches significance.

TABLE 10

SPEARMAN'S RANK ORDER CORRELATIONS BETWEEN BAYLEY SCORES (PDI & MDI), H.O.M.E. SCORES, AND I.E.I.

	H.O.M.E. 1	H.O.M.E. 3
MDI_1	.89*	-
MDI_3	-	.61
IEI_{MDI}	.20	.30
PDI_1	.66	-
PDI_3	-	.93*
IEI_{PDI}	.70	.60

* $P < .05$, $N = 6$

Question 4: The skills taught to the infants as a result of participation in the Early Education Program will generalize to situations outside the direct teaching situations.

In order to consider changes in the children's behavior as a result of their participation in intervention, it was necessary to transform the observational data to some comparable form. This was done by examining the total amount of time spent exhibiting the behaviors of interest, i.e., tabulating the number of ten second intervals in which a behavior occurred, and dividing this by the total number of ten second intervals in which it was possible for the behavior to occur, i.e., total number of ten second intervals in which observation occurred. The resulting proportion indicates how many intervals for the given observation period were spent displaying a particular behavior. The mean proportion of intervals for infant behaviors one to eight for all families for each of the six observation sessions were then subjected to a standard one way analysis of variance, with repeated measures. The mean proportion for each of the six observations studied are presented in Table 11, along with F ratios indicating significant main effects for trends. These significant trends are depicted graphically in Figure 6.

Inspection of the data displayed in Table 11 reveals some interesting patterns. There is a significant decrease in positive mother directed behaviors. As reported by other researchers (Belsky, Goode and Most, 1980; Fenson et al, 1976;

TABLE 11

MEAN PROPORTION OF INTERVALS FOR INFANT BEHAVIORS (ALL FAMILIES) OVER OBSERVATION PERIODS

Observation #	1	2	3	4	5	6	F[a]
BEHAVIORS							
INFANT							
Positive mother-directed behaviors	.229	.313	.155	.212	.202	.209	3.09*
Going from place to place	.006	.006	.030	.024	.030	.042	1.78
Looking at/Playing with materials	.187	.191	.259	.241	.146	.109	1.52
Negative Expression	.034	.014	.026	.048	.036	.026	0.40
Eating	.188	.119	.173	.182	.108	.057	2.03
Interacting with people	.050	.052	.016	.024	.019	.010	1.01
Expressive physical	.021	.046	.044	.068	.022	.083	3.67*
Vocalization	.132	.146	.138	.195	.227	.216	1.71

[a]df = 5,25

*p < .05

**p < .01

INFANT BEHAVIOURS SHOWING SIGNIFICANT CHANGES (ALL FAMILIES)

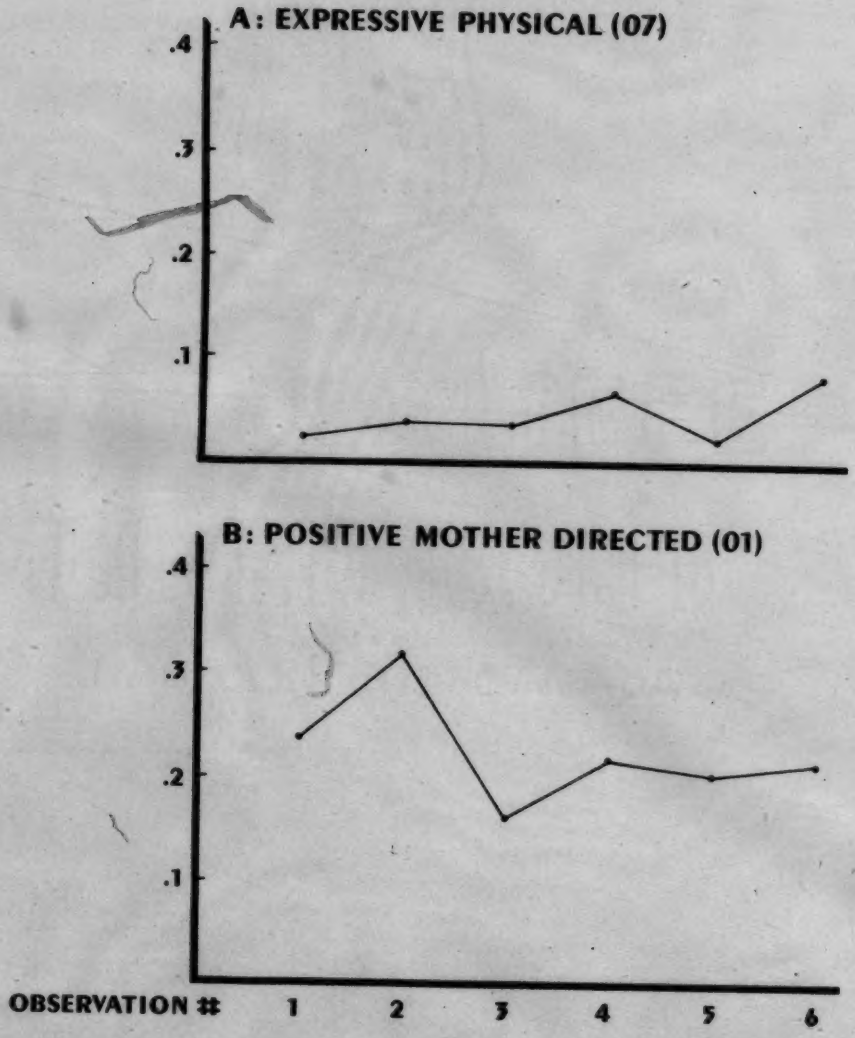


FIGURE 6

McCall, 1974). This may represent the increasing competence of the infant as an explorer and decreasing reliance on mother as the primary source of stimulation and materials. Unfortunately this hypothesis was not supported in the present data by a corresponding increase in the infants looking at or playing with material. Perhaps the significant increase in the infant's expressive physical behaviors marks a prelude to this type of exploratory behavior described by Belsky, Goode and Most (1980). There is a general, but not significant increase in the infant's locomotion and vocalization. At observation 1, the children spent 13% of the time observed vocalizing, while at observation 4, 19.5% of the time was spent in this activity and at observation 5 this had risen to 21.6% of the infant's time. Similarly, less than 1% of the infant's time is spent going from place to place at observation 1, while at observation 4, more than 2% of the time was spent in this activity, and more than 4% at observation 6. These differences were tested using Friedman's rank test for correlated samples, but were not significant.

The mean proportions of infant behaviors over the intervention period for all families are depicted graphically in Figure 7; while behaviors 01 (positive mother direct behaviors), 03 (play with materials), and 08 (vocalization), are shown for each infant over the intervention period in the figures in Appendix G). These behaviors were of particular interest because they reflect those aspects of the curriculum most emphasized in these early months of intervention: cognition, and language, particularly receptive language, but also expressive language.

INFANT BEHAVIORS OVER INTERVENTION PERIOD - ALL FAMILIES

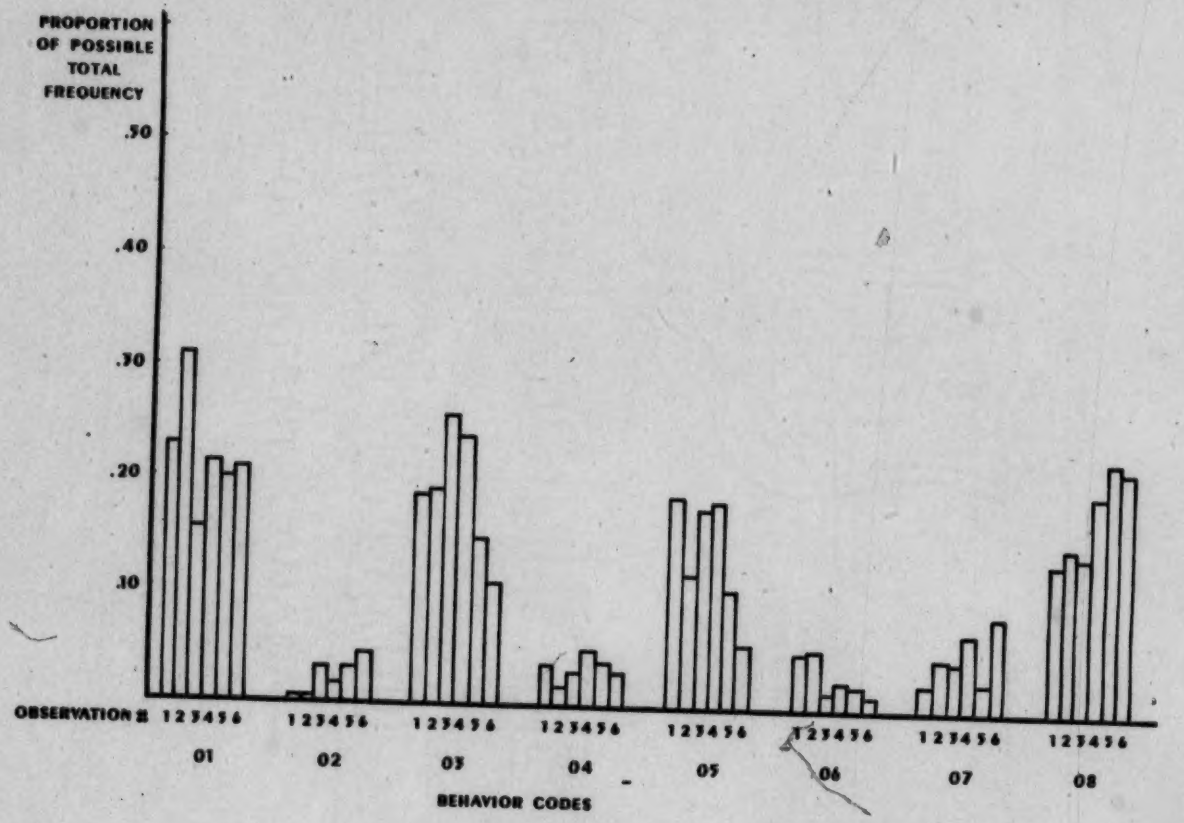


FIGURE 7

Question 5: The skills taught to the parents as a result of participation in the Early Education Program will generalize to situations outside the direct teaching situation.

Mother behaviors were transformed and analyzed in the same manner as described for the infant behaviors in question 4. The mean proportions of intervals for mother behaviors 11 to 19 for all families for each of the six observations as well as F ratios indicating significant main effects for trends, are depicted in Table 12. The two significant trends are depicted graphically in Figure 8.

Inspection of the data displayed in Table 12, reveals some interesting patterns; however, the anticipated trends did not materialize. The decline in mother's attending to the infant's physical need is reflective of the infant's rapid development and the growth of independent action. The gradual decline of mother's physical contact with her infant also reflects his growing mobility and increased independence. This is also consistent with Belsky, Goode and Most's findings (1980) in that mothers come to rely increasingly on verbal devices to stimulate their toddlers. However the mother's verbal strategies did not show a corresponding increase. Perhaps mothers of handicapped babies already utilize a greater number of verbal strategies at an early age so they do not show a noticeable increase as the child gets older. One trend that was quite consistent was the gradual increase in mother's use of gesture. Gestures are an integral part of the teaching paradigm at the Early Education Program and the increase from less than 2% at

TABLE 12

MEAN PROPORTION OF INTERVALS FOR MOTHER BEHAVIORS (ALL FAMILIES) OVER OBSERVATION PERIODS

Observation #	1	2	3	4	5	6	F[a]
BEHAVIORS							
MOTHER							
Attending infant's physical need	.273	.218	.221	.296	.128	.079	3.04*
Restricting infant's activity	.045	.070	.055	.040	.032	.070	1.12
Physical contact with infant	.418	.300	.344	.395	.123	.127	5.15**
Stimulating infant with materials	.086	.099	.129	.128	.119	.114	0.29
Looking at infant	.145	.057	.121	.070	.061	.041	1.17
Positive emotion toward infant	.201	.222	.165	.213	.168	.235	0.64
Verbal stimulation	.492	.589	.529	.498	.379	.444	1.29
Going and coming	.049	.050	.037	.022	.034	.062	1.06
Gesture	.019	.025	.023	.035	.038	.051	1.62

[a] df = 5,25

*p < .05

**p < .01

MOTHER BEHAVIOURS SHOWING SIGNIFICANT CHANGES (ALL FAMILIES)

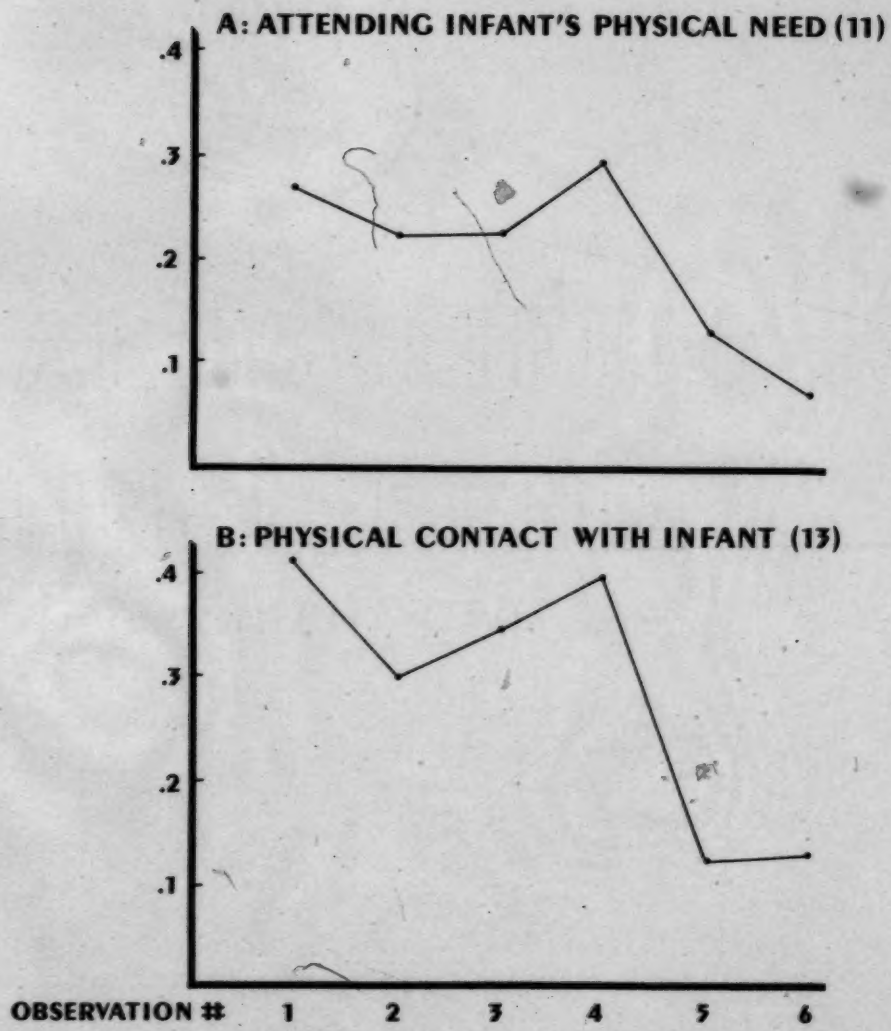


FIGURE 8

observation 1 to over 5% at observation 6 indicates that parents are incorporating this technique into their behavioral repetoire.

The mean proportions of mother behaviors over the intervention period for all families are depicted graphically in Figure 9; while behaviors 17 (verbal stimulation), 14 (stimulation with materials) and 19 (gesture) are shown individually for each mother over the intervention period in the figures in Appendix H. Inspection of the data for each individual family shows that four of the six families exhibit a gradual, but non-significant increase of stimulation with materials. Similarly these same four families also show a corresponding gradual increase in the use of gesture. This category approximates the "demonstrate" behavior code used by Belsky, Goode, and Most (1980) which showed a significant increase between nine and twelve months in their study with normal infants.

Question 6: Participation in the Early Education Program will result in a change in the mother-child interaction.

Certain co-occurrences of mother-child behaviors were considered probabilistically using an approach described by Bakeman (1978). According to Bakeman an index is needed to gauge whether behaviors coincide more or less frequently than their simple probabilities would predict. Behavior patterns can then be defined as those coincidences whose index exceeds some arbitrary decision rule. The index suggested by Bakeman is the binominal test z score, using the formula:

MOTHER BEHAVIORS OVER INTERVENTION PERIOD - ALL FAMILIES

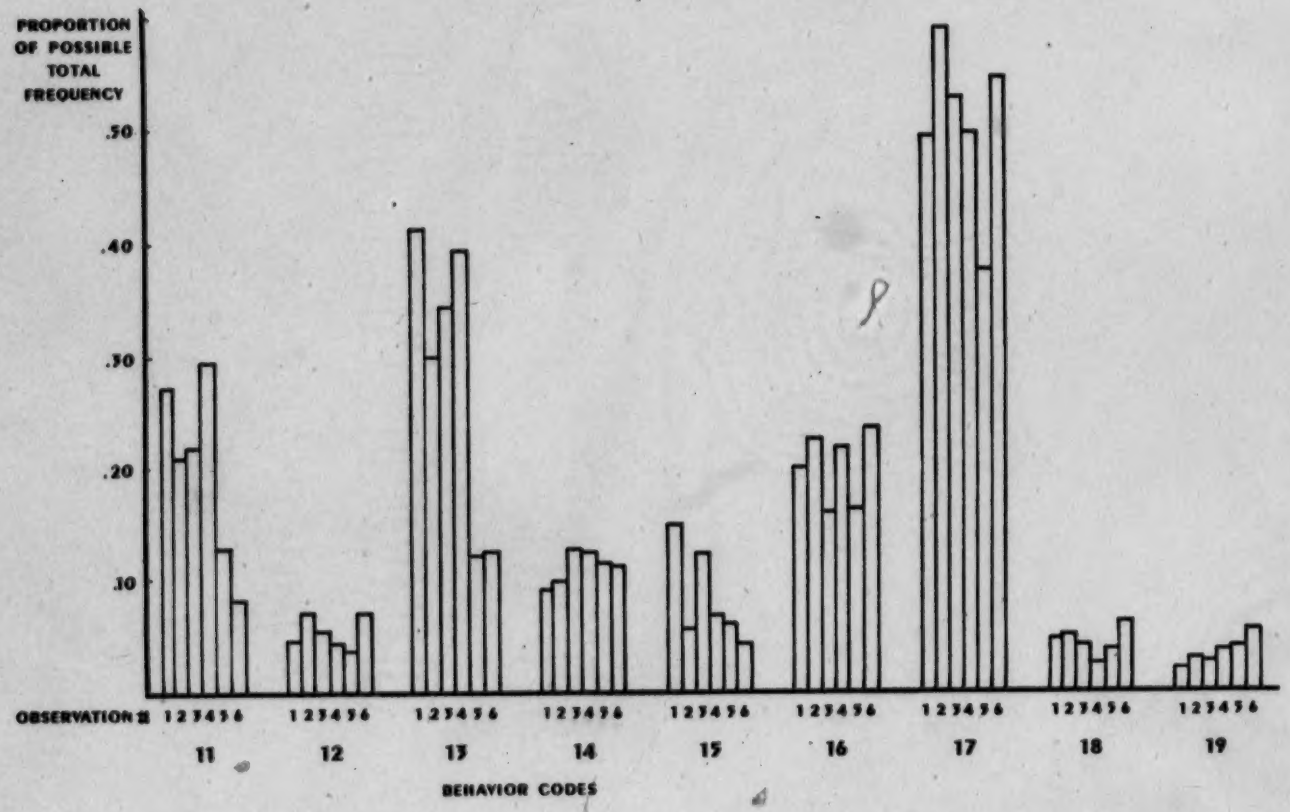


FIGURE 9

$$z = (x - NP)/NPZ$$

where x = observed joint frequency of the behaviors of interest;

NP = predicted joint frequency of these same behaviors;

NPQ = is the variance of the difference between the predicted and observed frequencies.

The arbitrary decision rule in the present study was that an index in excess of 1.96 would be sufficient to establish an individual behavior pattern. The behaviors chosen for analysis using this approach were the following: 01 (positive mother directed activities), 07 (looking at or playing with materials), and 08 (vocalization), for infants, and 13 (physical contact with infant), 14 (stimulating infant with materials), 16 (positive emotion towards infant), 17 (verbal stimulation), and 19 (gesture), for mother. These particular infant behaviors were chosen because they reflected those aspects of the Early Education curriculum taught during the intervention period, while the mother behaviors reflected crucial aspects of the direct and incidental teaching model. The z scores for each of these behavior pairings for each family over the six observation sessions were calculated and are shown in Appendix I. (Note: only z scores greater than 1 are shown.)

Inspection of these z scores revealed that certain behaviors coincide much more frequently than their simple probabilities would predict, both individually and over the entire group. For example, infant behavior 01 (positive

mother directed activities) and mother behavior 16 (positive emotion towards infant) co-occurred on 22 occasions* (15 of which were larger than would have been expected by chance). Similarly, infant behavior 01 (positive mother directed activities) co-occurred with mother behavior 17 (verbal stimulation) on 15 occasions* (7 of which were larger than would have been expected by chance). A reciprocal pattern emerges when mother behaviors are matched with the same infant behaviors. For example, mother behavior 17 (verbal stimulation) and child behavior 01 (positive mother directed activities) co-occurred 13 occasions* (4 of which were significant). Mother behavior 16 (positive emotion towards infant) co-occurred with child behavior 01 (positive mother directed activities) on 23 occasions* (16 of which were significant). Mother behavior 14 (stimulating infant with materials) co-occurred with infant behavior 03 (looking at or playing with materials) on 21 occasions* (12 of which were significant). These particular patterns were further examined by computing a group z score based on mean frequencies for each observation session. These are shown in Table 13.

In examining the behavior pair mother stimulates infant with materials (14) and infant looking at or playing with materials (03), we note corresponding significance levels for each combination. That is, when mother stimulates the infant with materials, the infant looks at or play with materials more often than their simple probabilities would predict on four of the six observation sessions. Similarly, when the infant is looking at or playing with materials, the mother stimulates the infant

* all values are out of a possible 36.

TABLE 13

MEAN Z-VALUES ESTIMATING THE SIGNIFICANCE OF SPECIFIC MOTHER/CHILD BEHAVIOR CO-OCCURRENCES RELATIVE TO THE ESTIMATES DERIVED FROM SIMPLE PROBABILITIES

Observation	#1	#2	#3	#4	#5	#6
Probability of behavior 14, given 03	2.256*	1.572	1.422	2.869**	3.896**	2.738**
Probability of behavior 03, given 14	2.56*	1.452	.0185	3.199**	3.912**	2.659**
Probability of behavior 16, given 01	2.286**	3.0496**	3.0279**	3.1358**	2.618**	4.221**
Probability of behavior 01, given 16	2.384*	3.206**	3.574**	3.236**	2.663**	4.038**
Probability of behavior 17, given 01	2.532*	1.258	1.784	2.251*	-.0277	2.346*
Probability of behavior 01, given 17	2.98**	2.75**	2.09*	2.689**	.1169	2.673**

*p > .05 **p > .01

with materials more often than their simple probabilities would predict on the same four observation sessions. There is a decline in the initial significant pairing of these two behaviors in observations two and three, with a re-establishment of the pattern in observations four, five and six.

Positive emotion towards infant and positive mother directed activities show a strong pattern of co-occurrence over the six sessions. Mother shows positive emotion towards the infant, when the infant displays positive mother directed activities more than you would expect from their simple probabilities on all six observation sessions. Similarly, the infant displays positive mother directed activities, when the mother shows positive emotion towards the infant more than you would expect by chance on all six observation sessions.

Mother stimulates the infant verbally, and positive mother directed activities are an interesting behavior pair in terms of the differences in their respective probabilities. It appears that the infant is more likely to respond positively to mother's verbal stimulation (on five of six observations this pairing occurs more often than their simple probabilities would predict) than the reverse. Mother stimulating the infant verbally when the infant displays positive mother directed behaviors occurs more than you would expect by chance on only three of the six observation sessions. In other words, the infant responding positively to the mother's verbalizations co-occurred more often than you expect from their simple probabilities, more often than the mother responding verbally to a positive act on the part of the infant.

CHAPTER VI

DISCUSSION

The results of this study provide evidence that the home component of the Early Education Program is an effective intervention approach for working with moderately handicapped infants. It appears that the curriculum and teaching format used by the parents resulted in developmental gains in both the psychomotor and mental areas measured by the Bayley Scales. These results are consistent with the findings of other researchers (Russell and Connolly, 1976; Hanson and Swarz, 1978; Clunies-Ross, 1979; Ludlow and Allen, 1979; Hanson, 1977; Maisto and German, 1978; Hayden and Haring, 1976) who have used normative instruments to measure program effectiveness. The program also seems to have been effective in preventing the decrease in intellectual functioning often associated with moderate forms of mental retardation such as Down's Syndrome (Centerwall and Centerwall, 1960; Carr, 1975; Shipe and Shotwell, 1965; Clunies-Ross, 1979). By translating the Bayley scores into an intervention efficiency index, we saw that the program resulted in an overall efficiency of .71, which means that the infants' mental and psychomotor progress was approximately three quarters of their chronological development. The slightly greater impact in the area of mental development may result from a number of factors, including the initial program emphasis on cognitive skills,

the greater ease with which these skills can be taught, and the already existing social environment in which the infant resides. Skill acquisition charts reflecting individual children's progress are included in Appendix J.

The satisfaction of the parents with the Early Education program is evident from their responses to the parent feedback questionnaire. All felt their children were profitting from participation in the program. Specifically the parents cited the cognitive area as showing the most improvement, with the language and motor areas showing somewhat less progress, and the self help area showing least progress. This was felt to be more indicative of the children's current level of development than reflective of the program's strengths and weaknesses. It is interesting to note the consistency of the parents' estimate of their children's progress with the Bayley results. The parents were less sure of their children's use of their new skills in their everyday environment.

The parents also identified areas of their own increased skill development as well as feeling more confident, and more optimistic about their child's future. All of the mothers felt they handled this child differently than their other children, with four of the six mothers attributing this change to participation in the program. In contrast to their infants' generalized use of new skills, all mothers reported using the Early Education teaching strategies a lot in their daily interactions with their infants.

There was some suggestion that the program had impacted those areas of the physical and social environment felt to

be associated with children's cognitive development. The subscales of the H.O.M.E. which showed the greatest amount of positive change were those identified by the authors as most highly correlated with later cognitive development (Caldwell and Bradley, 1970). The major implication of these results however, may be the inappropriateness of this measure to evaluate the changes within the home environment as a result of program participation. As suggested by Stevenson and Lamb (1979) the H.O.M.E. may be too gross or insensitive to measure the more fine-grained differences between middle class homes. It appears to measure a more global type of stimulation, and once this level has been reached it lacks the refinement to detect more subtle differences.

The significant correlation between the initial home score and the childrens' mental development index suggests that those children receiving the most stimulation functioned better on the Bayley initially. What is even more interesting however, is the lack of significance between these two measures at the end of the evaluation period. This seems to suggest that the program has been successful in promoting the children's mental development, so that the initial relationship between home stimulation and the child's cognitive functioning is attenuated.

In other words the program seems to level the effect of environmental stimulation. This may be related to the increases seen in Subscale I, emotional and verbal responsivity of mother for the four families who did not ceiling on the

instrument. Similarly, a reverse trend is shown with the children's psychomotor development. The level of stimulation within the home is not significantly correlated with the children's psychomotor development at the beginning of the evaluation, but this correlation becomes significant by the end of evaluation. The program appears to have impacted the home environment such that the parents have incorporated techniques into their behavior repetoire that stimulate their children's motor development. This finding may be associated with the increases seen in Subscales IV (provision of appropriate play materials) and V (maternal involvement with child). In fact two of the parents reported increased physical contact with their infants on the parent feedback questionnaire.

An examination of the children's behavior in three typical daily activities: feeding, changing, and free play revealed significant changes in two of the eight behaviors measured. Specifically, the infants showed a significant decrease in positive mothered directed behaviors. This finding may represent the growing independence of the infants and the decreasing reliance on mother as the primary source of stimulation and materials. The increasing competence of infants as independent explorers during the last three months of the first year and the first half of the second year of life has been reported by other researchers (Belsky, Goode and Most, 1980; Fenson et al, 1976; McCall, 1974). The significant increase in the infants' expressive physical behavior may reflect increasing assertion in terms of the

infant making his needs known. It may also reflect increased "pointing" and "reaching for objects" as these behaviors are subsumed under the expressive physical category. "Reaching for a dangling object" is one of the first behaviors taught as part of cognition curriculum, while "point" is an integral part of the receptive language program. There was also a general but not significant increase in the infants locomotion and vocalization.

An examination of the mother's behavior during the three previously described activities showed a significant decline in two of nine behaviors measured. The decline in mother attending the infant's physical need seems reflective of the infant's rapid skill development and subsequent independent action. The decline in mother's physical contact with infant may also reflect the infants growing independence, and may be related to the infants increasing mobility. The infants decline in positive mother directed activities may correlate with the decreasing amount of physical contact used by mother in her interactions with her infant.

The anticipated increases in mother's use of stimulation techniques, both verbal and through the use of materials, did not materialize. For some individual mothers there appeared to be some increase in stimulating their infants with materials; however, the verbal stimulation category displayed no consistent individual or group pattern. The absence of significant increases in verbal stimulation is particularly disappointing in view of the importance given to verbal interaction by many interventionists (notably Levenstein, 1970;

Bronfenbrenner, 1975). Little work has been done in comparing the language patterns of moderately handicapped infants and their caregivers, however, and it may be that the deficient patterns displayed by poverty or deprived families, may not be representative of the patterns between moderately handicapped infants and their mothers. In fact, it may be that mothers of handicapped infants display a greater amount of verbal interaction from the beginning, so that the gradual increase seen in mothers of normal infants (Belsky, Goode and Most, 1980) is absent. One trend that was consistent throughout was the gradual increase in mothers' use of gesture. Gestures are an integral part of the prompting sequence taught in the Early Education Program, and it appears that the mothers have incorporated this technique into their daily interactions with their infants.

The most interesting but most complex aspect of the study was an examination of the interactive patterns between mother and infant. This component can only be considered exploratory at this point. Methods of data analysis for interactional data are scarce, and not well developed. Our data was particularly limited by its concurrent nature, its non-exclusivity, and the small sample size. Using a probabilistic approach, however, we see that certain behaviors co-occur more often than their simple probabilities would suggest. Some of these patterns seem equally dependent, whether the infant behavior is considered first, or vice versa. Some behaviors, however, seem more dependent than in the reverse situation. Mother stimulating the infant with materials and the infant playing with or looking at materials is an example

of the first case. The mothers behavior is just as likely to occur given the infant's behavior as the infant's behavior is given the mother behavior.

The mothers positive emotion towards the infant, and the infants positive mother directed activities form an equally strong behavior pair. The infants positive mother directed activities however, is more likely to co-occur with mother's verbal stimulation than the reverse. This suggests that mother uses verbal stimulation as a more general strategy, and that it may co-occur with a number of different activities. Unfortunately as our data is concurrent, rather than sequential, we can only talk about behaviors occurring together, rather than one preceeding (causing) the other. Future investigation of co-occuring behaviors, however, using a sequential technique could provide valuable information about that elicitation of certain desired behaviors.

Limitations

In an excellent review of methodological problems in early intervention, Gray and Wandersman (1980) state

> The researcher is faced with a series of decisions concerning goals, sampling, comparison groups, design, measures, and analyses. Choices are often determined pragmatically according to various kinds of resources available. One's selections generally involve a trade off, advantages in one area being gained at the expense of desirable features in another one (p. 993).

Certainly when faced with these various decisions the choices for the present study were determined by the kinds

of resources available. One of the most difficult problems was the size of the sample. The home program of the Early Education Program only had nine "new" families. Of these nine, six agreed to participate in the present study. The small sample certainly limits the generalizability of the results; however, since a very specific program was being evaluated, generalizability of our specific results may not be an issue. A second major issue is the lack of a comparison group. Again the restricted population with which we are dealing makes use of a comparison group difficult, and more importantly the withholding of services for experimental reasons is not considered ethically viable. A third problem that stems from the first two is the limited number of data analysis techniques available given the sample size, and the type of data collected. An attempt has been made to supplement this lack by using more exploratory, qualitative, and descriptive approaches.

Two other, more specific problems arose during this present study. Firstly the low degree of inter-rater reliability for the observational measures casts doubt on their accuracy. Secondly, this difficulty prompted the reduction of Clarke-Stewart's original 46 discrete behavior categories into 17 behavior clusters. The use of these broader behavior clusters which included as many as nine separate behaviors made interpretation of the results difficult and conditional. Further, the coding of behaviors in a concurrent, non-exclusive fashion also complicated the task of data analysis.

Summary

In summary, the present study has demonstrated the effectiveness of the Early Education program in facilitating the development of moderately handicapped infants. The more definitive indicators of success were the traditional normative measures of child progress. These were supplemented by the more qualitative technique of parent questionnaires. The other measures, particularly the investigation of the generalizability of parent and child skills in everyday situations were less conclusive. Unfortunately it is difficult to interpret the degree to which the results reflected the methodological problems just described, or a genuine lack of generalization of skills on the part of the infants and mothers.

In reflecting on the impact of this intervention approach it is interesting to speculate on why and how the program works. In describing the Early Education Program, Kysela and his colleagues (1979) state, "the application of learning principles in this intervention process utilizes the most current knowledge of human learning to assist developmentally delayed children is the attainment of more normal growth patterns" (p. 128). The assumption underlying the program therefore seems to be that by teaching these "learning principles" to the parents of handicapped infants, more normal development will result. That more normal development occured is reflected by the children's performance on the Bayley Scales of Infant Development, and by their individual acquisition data (Appendix J). That the infants'

skill acquisition resulted from the parents application of the particular teaching strategies and curriculum employed by the Early Education Program is more difficult to say with any degree of assurance. Certainly there were no discernible patterns shown between the infant and mother behaviors, and the individual skill acquisition data.

It may be that the program had a greater impact on the parents' affective development and feelings of competency in relation to their infant. Perhaps the parents, provided with the weekly visits from the home visitor and a practical way of stimulating their handicapped infants, felt more confident of their ability to help their child. This increased confidence was reported by all the mothers who participated in the study. The increased confidence expressed by the parents may in turn have made the parents more sensitive to the cues given by their handicapped infants. This responsivity in parents is felt by many researchers to be crucial to the infants later development. Clarke-Stewart (1973) for example, found that maternal responsiveness was highly correlated with measures of the infants general competence and motivation.

Of equal importance in considering the success of this intervention program, is the impact of the program on the infants behavior. Perhaps the infants responsivity was heightened by their interaction with the home visitor during the assessment and parent training phase of intervention. The infant may have begun to exhibit more predictable behavior patterns that in turn elicited positive attention from the mother. Our co-occurrence data reflected the strong relation-

ship between positive emotion towards the infant. The powerfull influence that the infant has on the parent's behavior and, thus, indirectly on his own development has been supported repeatedly by research findings in recent years (Bromwich, 1980). For researchers such as Bromwich then, the function of intervention, is "intervening" in a parent infant system where the infant does not naturally evoke positive responses.

In returning to our original question of why and how the Early Education Program works, it seems that effectiveness is related to the impact of the program on the mother-child interaction. However, whether the interaction was affected by a change in the mother's behavior prompted by her perception of the infant's behavior or by acquisition of specific learning techniques employed by the Early Education Program, or by modifying the infant's cue giving and response behavior, or some combination of these possibilities, is difficult to assess. It remains an important area for future research in early intervention.

In conclusion, perhaps equally as important as the demonstration of the effectiveness of the Early Education Program, the present study offers a more general model for further evaluation of the early intervention process with moderately handicapped infants. It encompasses a multi-method multi-target approach that is necessary to evaluate the complexity of home based intervention and its goals.

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APPENDIX A

FIVE AREAS OF THE DEVELOPMENTAL CURRICULUM

Cognition:	ability to remember, see or hear likeness and difference, and to determine relationships between ideas and things.
Self-help:	behaviors enabling child to care for himself in areas of eating, dressing, bathing and toileting.
Motor:	concerned with coordinated movements of large and small muscles.
Language:	ability to receive and understand information-showing meaning through speech and gestures.
Socialization:	concerned with appropriate interpersonal behaviors with adults and peers.

APPENDIX B

PARENT FEEDBACK FORM

Please circle the most appropriate response.

1. As a result of participating in the Early Education Program, I feel my child has: (cognition meaning remembering, recognizing similarities and differences, and determining relationships between ideas and things)

   (a) shown marked improvement in cognitive skills
   (b) shown some improvement in cognitive skills
   (c) shown little improvement in cognitive skills
   (d) shown no improvement in cognitive skills.

2. As a result of participating in the Early Education Program, I feel my child has: (self-help meaning behaviors that enable child to care for himself in the areas of eating, dressing, bathing, and toileting)

   (a) shown marked improvement in self-help skills
   (b) shown some improvement in self-help skills
   (c) shown little improvement in self-help skills
   (d) shown no improvement in self-help skills.

3. As a result of participating in the Early Education Program, I feel my child has: (motor meaning coordinated movements of large and small muscles)

   (a) shown marked improvement in motor skills
   (b) shown some improvement in motor skills
   (c) shown little improvement in motor skills
   (d) shown no improvement in motor skills.

4. As a result of participating in the Early Education Program, I feel my child has: (language meaning receiving and understanding information and showing meaning through speech and gestures)

   (a) shown marked improvement in language skills
   (b) shown some improvement in language skills
   (c) shown little improvement in language skills
   (d) shown no improvement in language skills.

5. As a result of participating in the Early Education Program, I feel my child uses his new skills in everyday activities:

   (a) a lot
   (b) some
   (c) very little
   (d) not at all.

Parent Feedback Form - cont.

6. As a result of participating in the Early Education Program, I feel:

   (a) very confident that I can teach my child new skills
   (b) more confident than before that I can teach my child new skills
   (c) as confident as before that I can teach my child new skills
   (d) less confident than before that I can teach my child new skills.

7. As a result of participating in the Early Education Program, I feel:

   (a) very optimistic about my child's learning potential
   (b) more optimistic than before about my child's learning potential
   (c) as optimistic as before about my child's learning potential
   (d) less optimistic than before about my child's learning potential.

8. Do you feel you handle this infant differently than your other children?

   (a) Yes
   (b) No
   If yes, how _____

   _____

9. As a result of participating in the Early Education Program, I have changed my handling of this child:

   (a) Yes
   (b) No
   If yes, how _____

   _____

10. I use the teaching strategies I have learned in everyday situation (outside teaching sessions)

    (a) a lot
    (b) some
    (c) very little
    (d) not at all.

11. Are other family members involved in implementing the Early Education Program?

    (a) Yes
    (b) No
    If yes, who (please list) _____

    _____

Parent Feedback Form - cont.

12. What I find most difficult about the program is :_____

_____

_____

13. What I enjoy most about the program is:_____

_____

_____

14. I think the program could be improved by: _____

_____

_____

15. I plan to continue with the program next year:

(a) Yes
(b) No

16. Additional comments:_____

_____

APPENDIX C

MOTHER-CHILD INTERACTION BEHAVIOR CLUSTERS	
INFANT BEHAVIORS	Categories Included
01 Positive Mother Directed Activities	Holds (h), Affectionate Tactual Contact (atc), Looks at Mother (lM), Smiles (sm), Goes to Mother (goesM), Gives (gives), Calls (calls), Appropriate Response (appr), Shows (shows).
02 Going From Place to Place	Goes (goes).
03 Looking At or Playing With Materials	Plays (pl), Drops (drops), Takes (takes), Looks at Materials (l( ).
04 Negative Expression	Negative Vocalization (neg), Cries (cries), No Takes (ntakes), Hurts (hurts).
05 Eating	Eats (eats).
06 Interacting with People	Looks (l ( ).
07 Expressive Physical	Expressive Physical (exp).
08 Vocalization	Calls (calls), Vocalizes (voc), Vocal Demand (vocD), Imitates (imit).

MOTHER-CHILD INTERACTION BEHAVIOR CLUSTERS - cont.

MATERNAL BEHAVIORS		
11	Attending Infant's Physical Need	Attends Need (att).
12	Restricting Infant's Activity	Puts (puts), Restrains (rest), No Gives (ngives), Takes (takes), Punishes (pun), Reprimands (reps).
13	Physical Contact With Infant	Holds (h), Physical Stimulation (phys), Affectionate Tactual Contact (atc), Guidance (guid).
14	Stimulating Infant With Materials	Plays (pl), Gives (gives), Shows (shows), Models (mod).
15	Looking At Infant	Looks (l).
16	Positive Emotion Toward Infant	Praises (pr), Smiles (sm), Appropriate Response (appr).
17	Verbal Stimulation	Names (n), Instrumental Speech (inst), Social Speech (soc)(socR), Imitates (imit), Verbal Prompting (vp).
18	Coming and Going	Comes Room (cm rm), Comes Baby (cmB), Leaves Room (lv rm), Leaves Baby (lvB).
19	Gesture	Gesture (gest).

APPENDIX D

PER CENT OF INTER-OBSERVER RELIABILITY*

Date	Oct. 26	Nov. 1	Nov. 26	Jan. 14	Jan. 28	Feb. 22	Mar. 24	May 6
Family								
01					Baby M F 58.5 81 C - - FP 72.4 70.8 $\bar{X}$ = 65.5 75.9	Baby M F 82 80 C 60 93 FP 67 78 $\bar{X}$ = 69.7 83.7		Baby M F 78 76 C 20 68 FP 60.4 57.2 $\bar{X}$ = 52.8 67.1
02			Baby M F - - C 79 83 FP 60.3 65 $\bar{X}$ = 69.7 74		Baby M F 84.5 88.5 C - - FP 78.4 77.25 $\bar{X}$ = 81.5 82.9			
03		Baby M F 50.3 59.3 C 75 57 FP 61 56 $\bar{X}$ = 62 57.3						
04								
05	Baby M F 74 83 C 52 55 FP 70 77 $\bar{X}$ = 65.3 71.7			Baby M F 87.8 97 C 92.5 58 FP 88 83.6 $\bar{X}$ = 89.4 79.3				
06				Baby M F 66.2 67.6 C 30 69 FP 43 60.0 $\bar{X}$ = 46.4 65.3			Baby M F 78 76 C 20 68 FP 60.4 57.2 $\bar{X}$ = 52.8 67.1	

F = Feeding
C = Changing
FP = Free Play

* Calculated for mother and infant behaviors for all three activities, feeding, changing, and free play. Mean reliability for observation also given for mother and infant behaviors.

APPENDIX E

PROPORTIONS OF MOTHER AND INFANT BEHAVIORS BY OBSERVATION FOR ALL FAMILIES

Behaviors	Observ. #1	Observ. #2	Observ. #3	Observ. #4	Observ. #5	Observ. #6
01	.309,.247,.250, .229,.094,.244	.238,.208,.475 .381,.213,.364	.214,.107,.136, .115,.083,.273	.202,.250,.264, .280,.121,.158	.116,.321,.219, .117,.175,.263	.280,.250,.233, .225,.265
02	.000,.000,.000, .021,.000,.016	.000,.000,.038, .000,.000,.000	.024,.012,.080, .063,.000,.000	.060,.000,.042, .040,.000,.000	.008,.018,.073, .083,.000,.000	.032,.091,.121, .000,.010
03	.136,.226,.083, .281,.332,.063	.185,.451,.200, .000,.255,.053	.179,.524,.170, .208,.403,.068	.214,.365,.167, .307,.205,.189	.140,.089,.063, .308,.117,.162	.183,.159,.095, .000,.216
04	.000,.000,.000, .188,.016,.000	.000,.000,.013, .012,.000,.061	.012,.000,.102, .021,.000,.023	.012,.000,.083, .013,.045,.137	.023,.000,.083, .108,.000,.000	.032,.000,.095, .012,.020
05	.025,.323,.125, .375,.203,.079	.108,.139,.038, .119,.255,.053	.024,.179,.045, .396,.306,.091	.012,.231,.000, .253,.356,.242	.047,.045,.031, .375,.058,.091	.022,.121,.069, .083,.049
06	.025,.022,.167, .000,.008,.079	.008,.063,.000, .155,.021,.068	.000,.060,.034, .000,.000,.000	.000,.019,.000, .013,.015,.095	.000,.116,.000, .000,.000,.000	.022,.038,.000, .000,.000
07	.000,.011,.000, .083,.016,.016	.038,.056,.025, .119,.011,.030	.000,.036,.000, .083,.063,.083	.024,.087,.000, .187,.076,.032	.023,.000,.000, .075,.033,.000	.140,.068,.043, .167,.078
08	.062,.086,.139, .188,.227,.087	.100,.174,.200, .190,.074,.136	.083,.298,.091, .083,.167,.106	.155,.173,.222, .147,.136,.337	.256,.313,.250, .108,.225,.212	.194,.258,.241, .252,.343
11	.074,.505,.111, .521,.328,.102	.092,.254,.075, .357,.468,.061	.048,.179,.045, .458,.458,.136	.024,.442,.014, .427,.545,.326	.062,.098,.021, .458,.067,.061	.075,.076,.095, .167,.059
12	.074,.065,.014, .063,.039,.016	.131,.042,.125, .024,.053,.045	.083,.000,.114, .052,.014,.068	.024,.038,.069, .040,.030,.042	.031,.000,.135, .008,.000,.020	.118,.068,.078, .012,.147
13	.296,.667,.306, .427,.609,.205	.254,.174,.288, .298,.500,.288	.143,.321,.261, .375,.569,.394	.083,.500,.181, .387,.485,.737	.085,.036,.104, .308,.092,.111	.161,.167,.078, .143,.216
14	.123,.098,.014, .104,.070,.110	.192,.104,.188, .036,.032,.045	.214,.071,.170, .240,.035,.045	.131,.183,.083, .120,.114,.137	.101,.054,.010, .258,.142,.152	.140,.212,.034, .036,.265
15	.037,.000,.083, .063,.500,.189	.054,.000,.075, .012,.096,.106	.012,.000,.080, .000,.521,.114	.012,.000,.056, .013,.288,.053	.054,.036,.073, .017,.133,.051	.011,.015,.129, .071,.020
16	.370,.086,.111, .490,.023,.126	.238,.271,.175, .369,.138,.144	.214,.119,.114, .292,.014,.235	.369,.250,.014, .427,.114,.105	.186,.161,.063, .224,.058,.313	.355,.364,.052, .298,.343
17	.667,.652,.444, .656,.125,.409	.500,.576,.638, .750,.457,.614	.821,.393,.568, .615,.208,.568	.155,.558,.417, .693,.250,.916	.411,.375,.219, .624,.258,.384	.591,.576,.371, .538,.588
18	.025,.032,.125, .042,.039,.031	.008,.063,.063, .083,.021,.061	.024,.071,.023, .010,.056,.038	.000,.000,.069, .040,.023,.000	.000,.045,.104, .000,.058,.000	.000,.061,.172, .024,.118
19	.062,.011,.000, .042,.000,.000	.069,.000,.025, .024,.000,.030	.602,.012,.000, .000,.042,.023	.095,.019,.000, .067,.008,.021	.070,.027,.031, .025,.025,.051	.172,.076,.009, .009,.012,.039

*(N = 5)

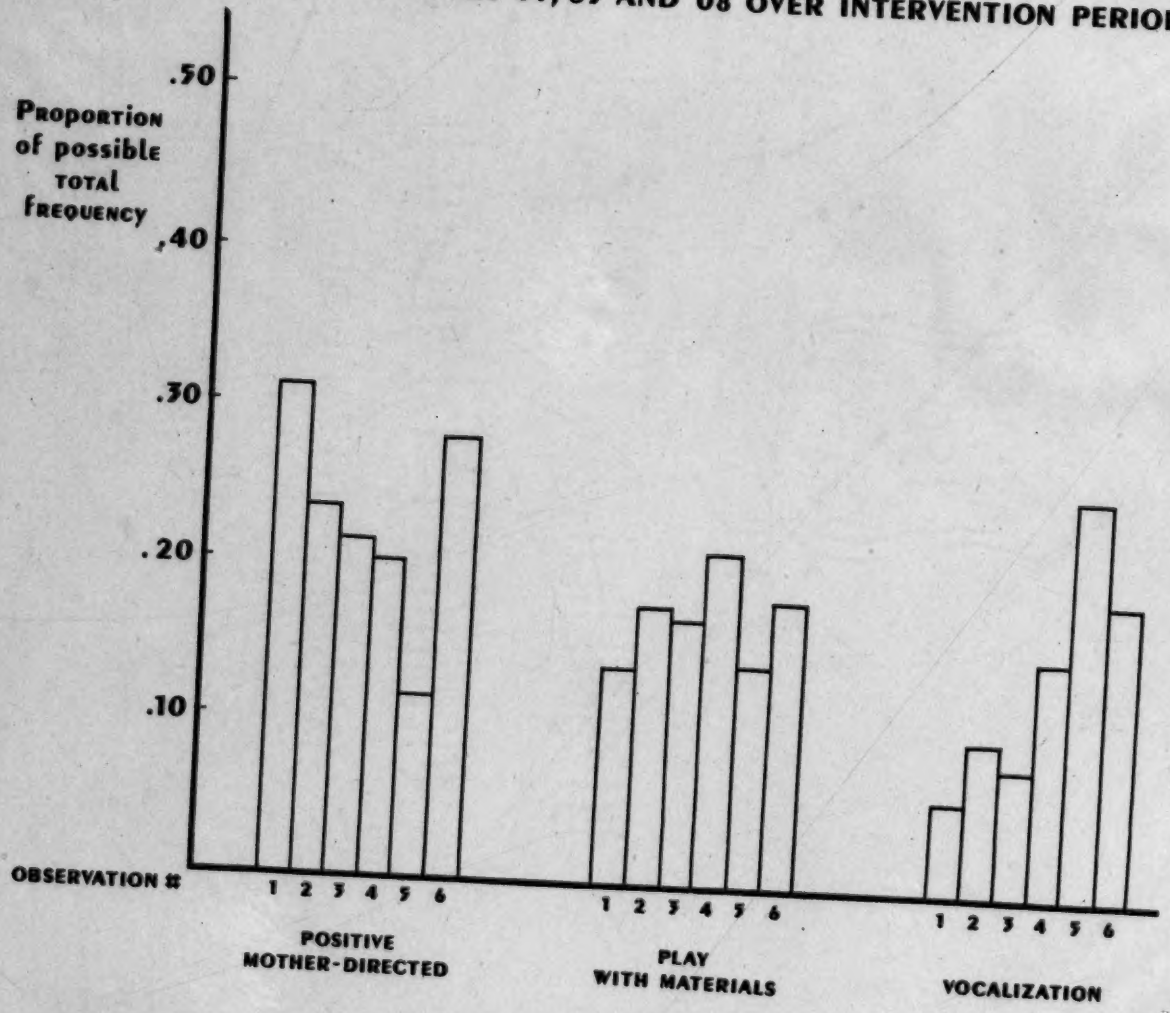
APPENDIX F

NUMBER OF TEN SECOND INTERVALS OF OBSERVATION
BY ACTIVITY BY FAMILY

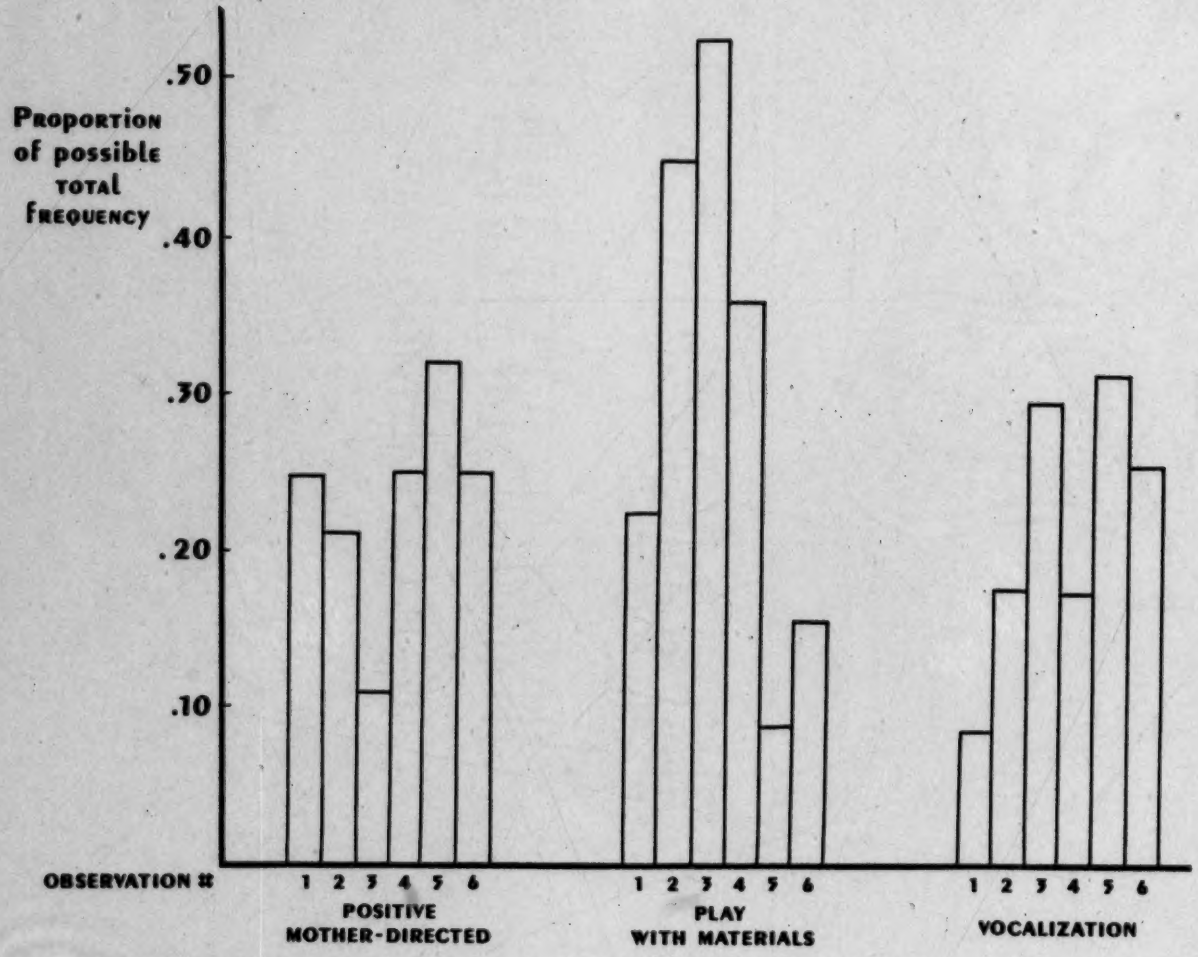
		Family 01	Family 02	Family 03	Family 04	Family 05	Family 06
Observ. 1	Feeding	9	33	37	36	48	60
	Changing	12	12	11	24	20	7
	Free Play	60	48	23	36	60	60
	TOTAL	81	93	71	96	128	127
Observ. 2	Feeding	60	58	9	12	48	60
	Changing	10	24	11	24	10	60
	Free Play	60	60	60	48	36	60
	TOTAL	130	142	80	84	94	132
Observ. 3	Feeding	24	24	24	48	60	60
	Changing	0	0	5	9	24	12
	Free Play	60	60	60	40	60	60
	TOTAL	84	84	89	97	144	132
Observ. 4	Feeding	12	36	0	30	60	35
	Changing	12	8	12	9	12	0
	Free Play	60	60	60	36	60	60
	TOTAL	84	104	72	75	132	95
Observ. 5	Feeding	59	60	36	60	60	37
	Changing	10	4	0	0	0	6
	Free Play	60	48	60	60	60	57
	TOTAL	129	112	96	120	120	100
Observ. 6	Feeding	21	60	58	55	-	31
	Changing	12	14	0	30	-	12
	Free Play	60	60	58	-	-	60
	TOTAL	93	134	116	85	-	103

APPENDIX G

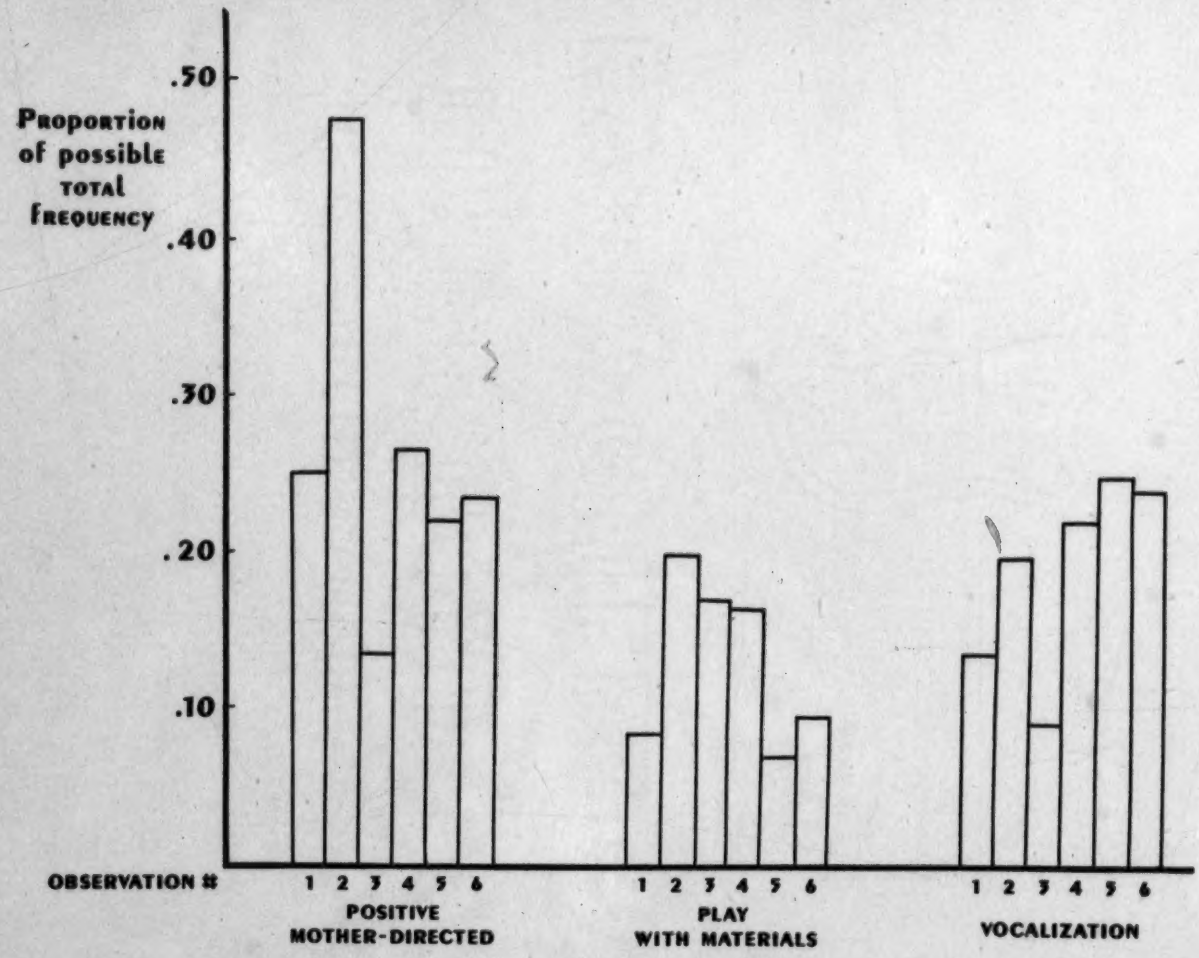
FAMILY 1: INFANT BEHAVIORS 01, 03 AND 08 OVER INTERVENTION PERIOD



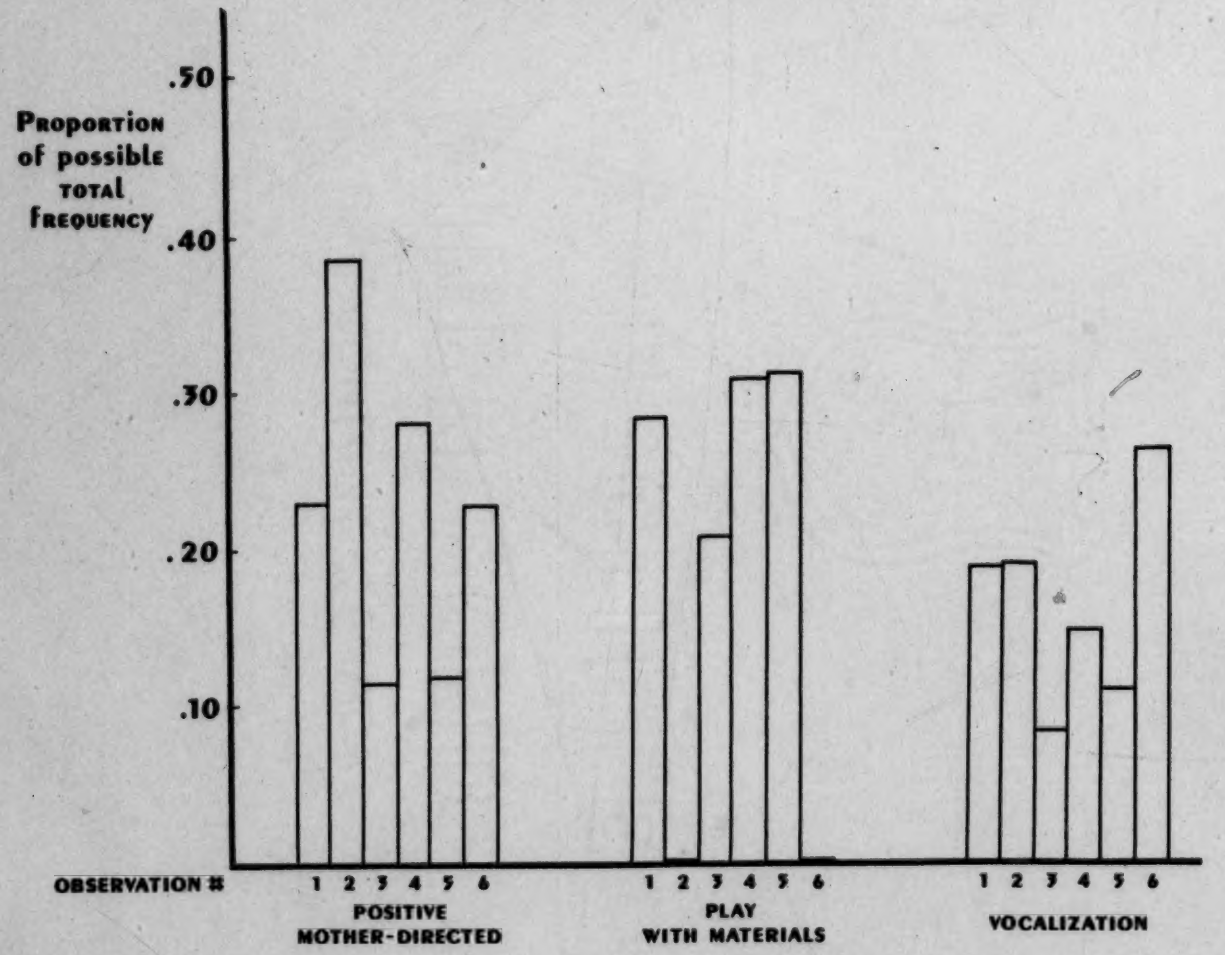
FAMILY 2: INFANT BEHAVIORS 01, 03 AND 08 OVER INTERVENTION PERIOD



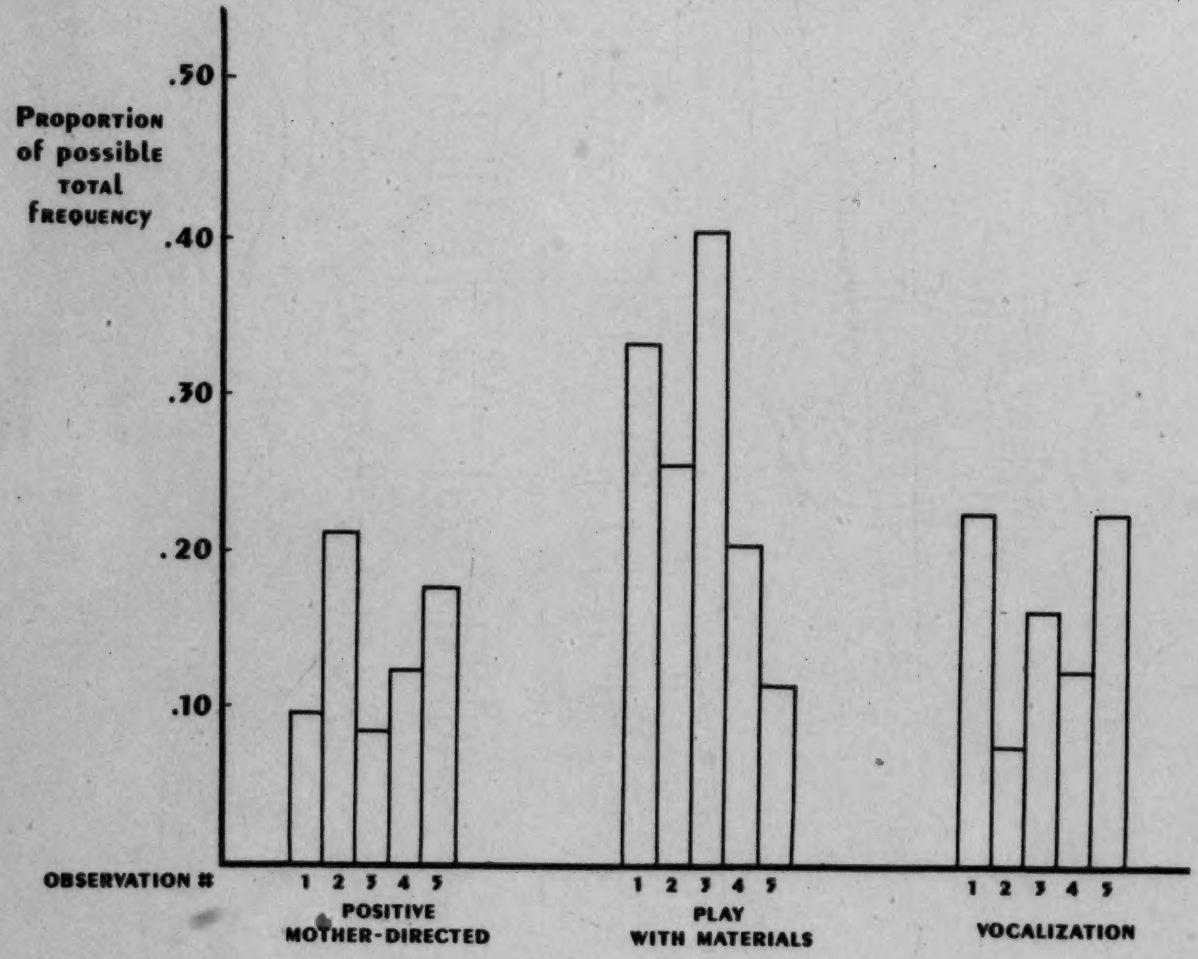
FAMILY 3: INFANT BEHAVIORS 01, 03 AND 08 OVER INTERVENTION PERIOD



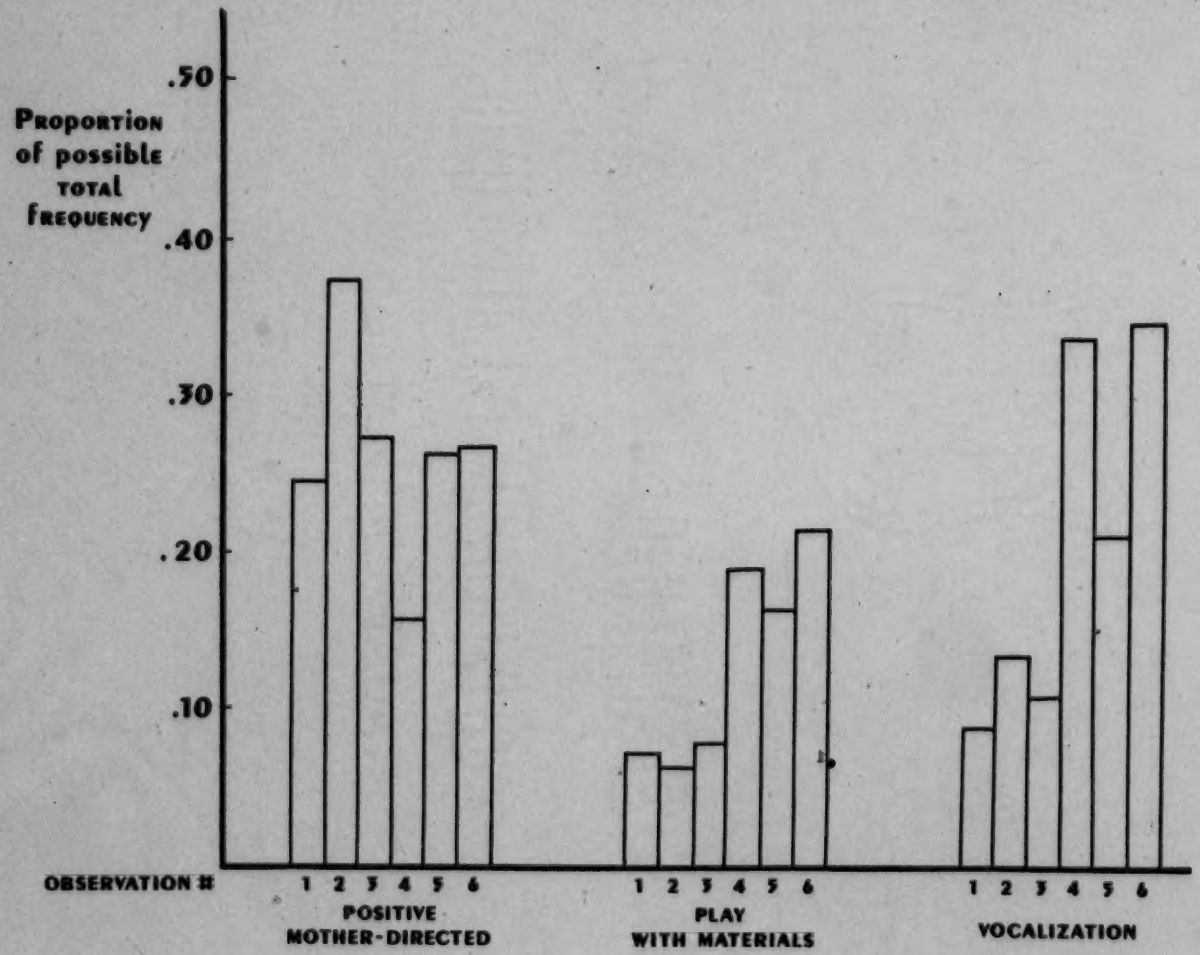
FAMILY 4: INFANT BEHAVIORS 01, 03 AND 08 OVER INTERVENTION PERIOD



FAMILY 5: INFANT BEHAVIORS 01, 03 AND 08 OVER INTERVENTION PERIOD



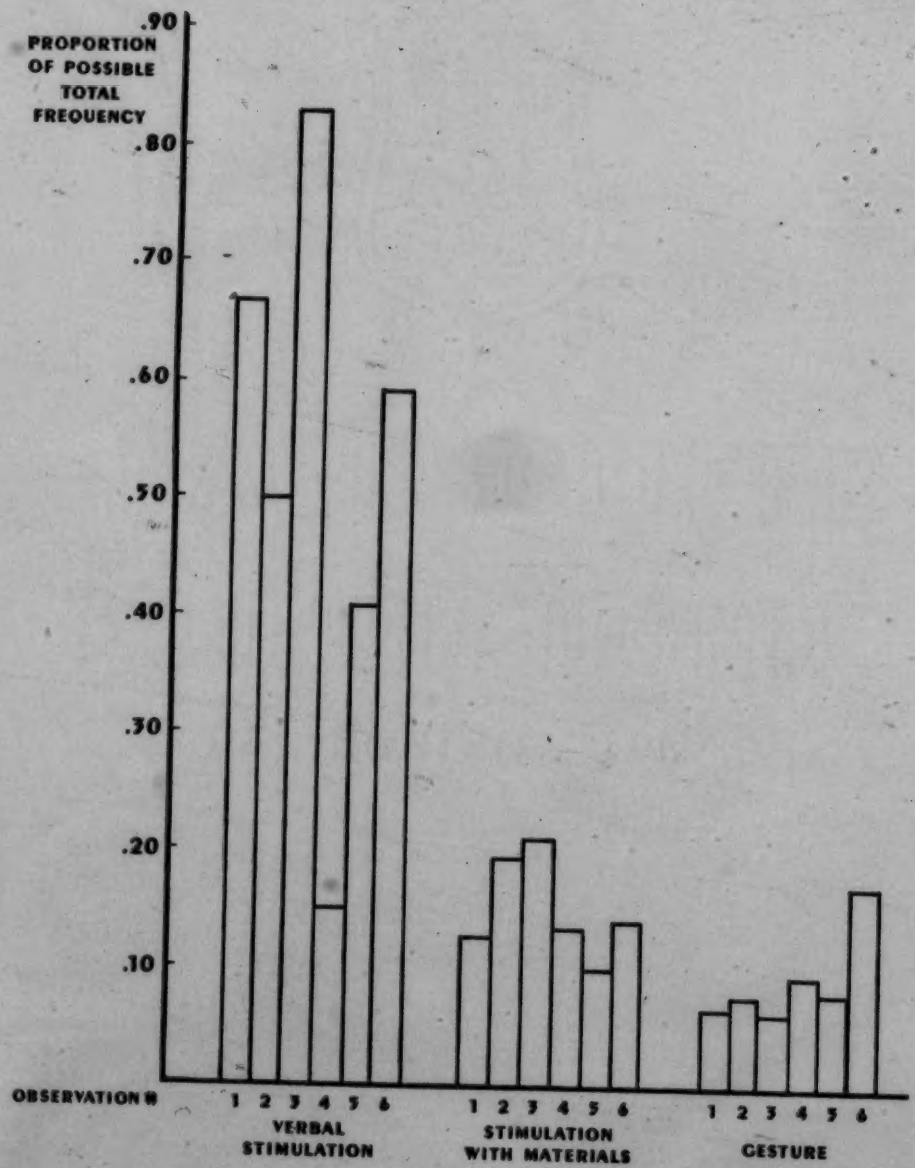
FAMILY 6: INFANT BEHAVIORS 01, 03 AND 08 OVER INTERVENTION PERIOD



APPENDIX H

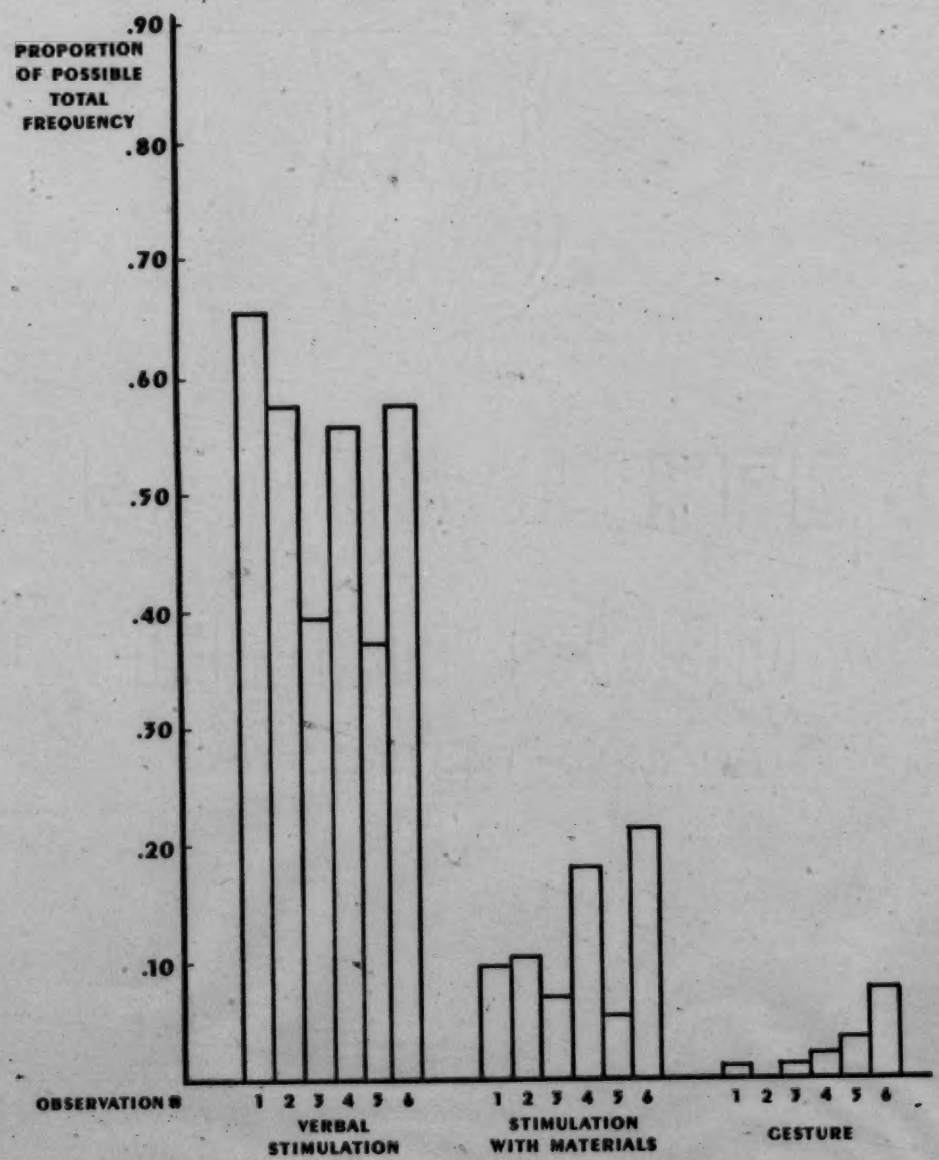
FAMILY 1.

MOTHER BEHAVIORS 17, 14 AND 19 OVER INTERVENTION PERIOD



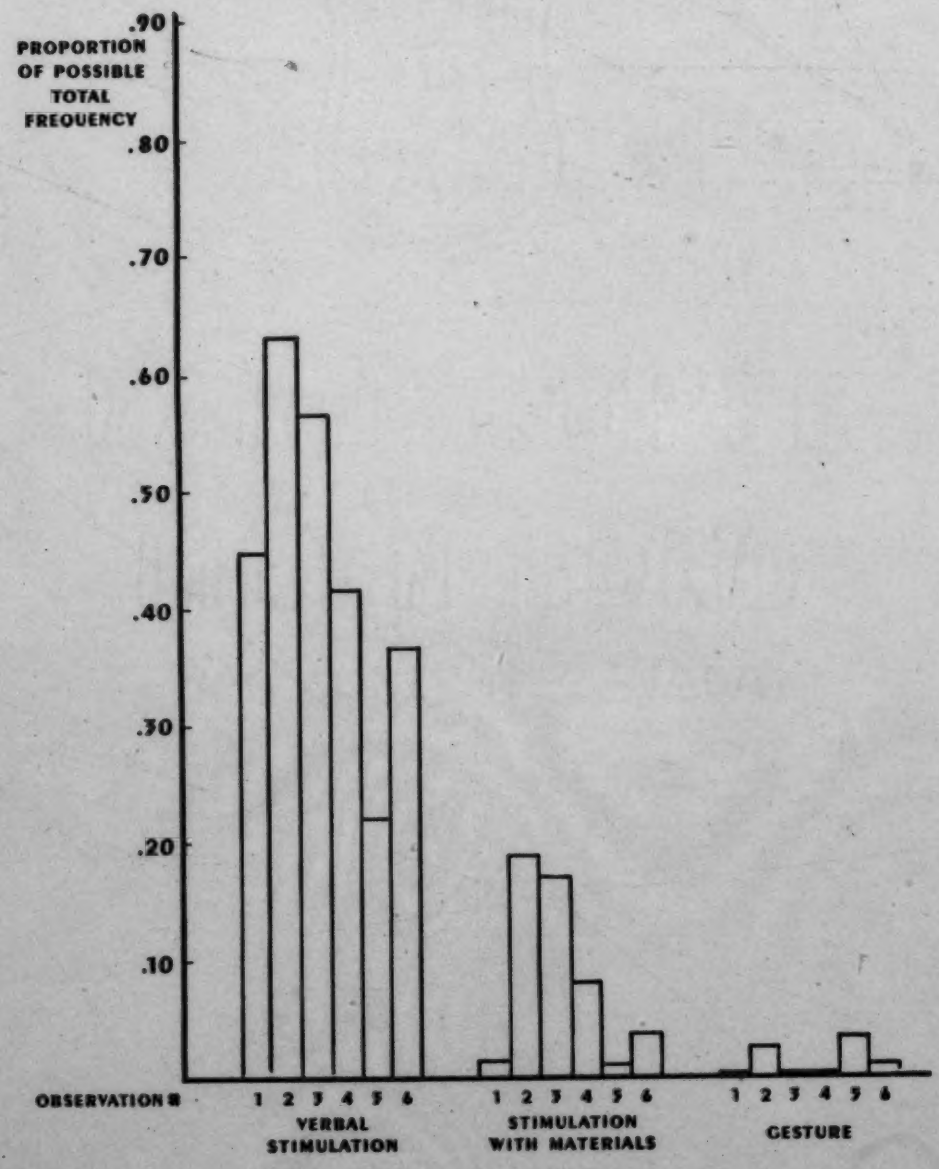
FAMILY 2.

MOTHER BEHAVIORS 17, 14 AND 19 OVER INTERVENTION PERIOD



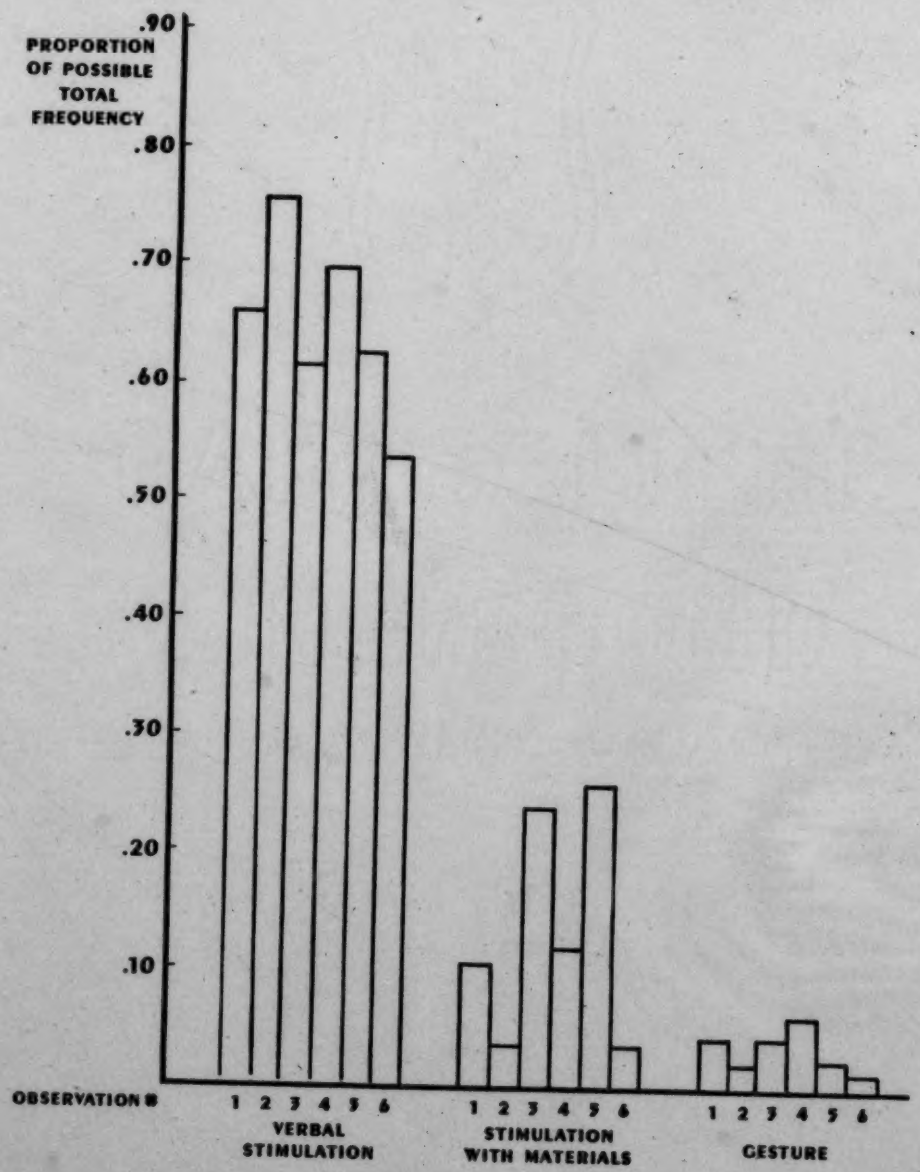
FAMILY 3.

MOTHER BEHAVIORS 17, 14 AND 19 OVER INTERVENTION PERIOD



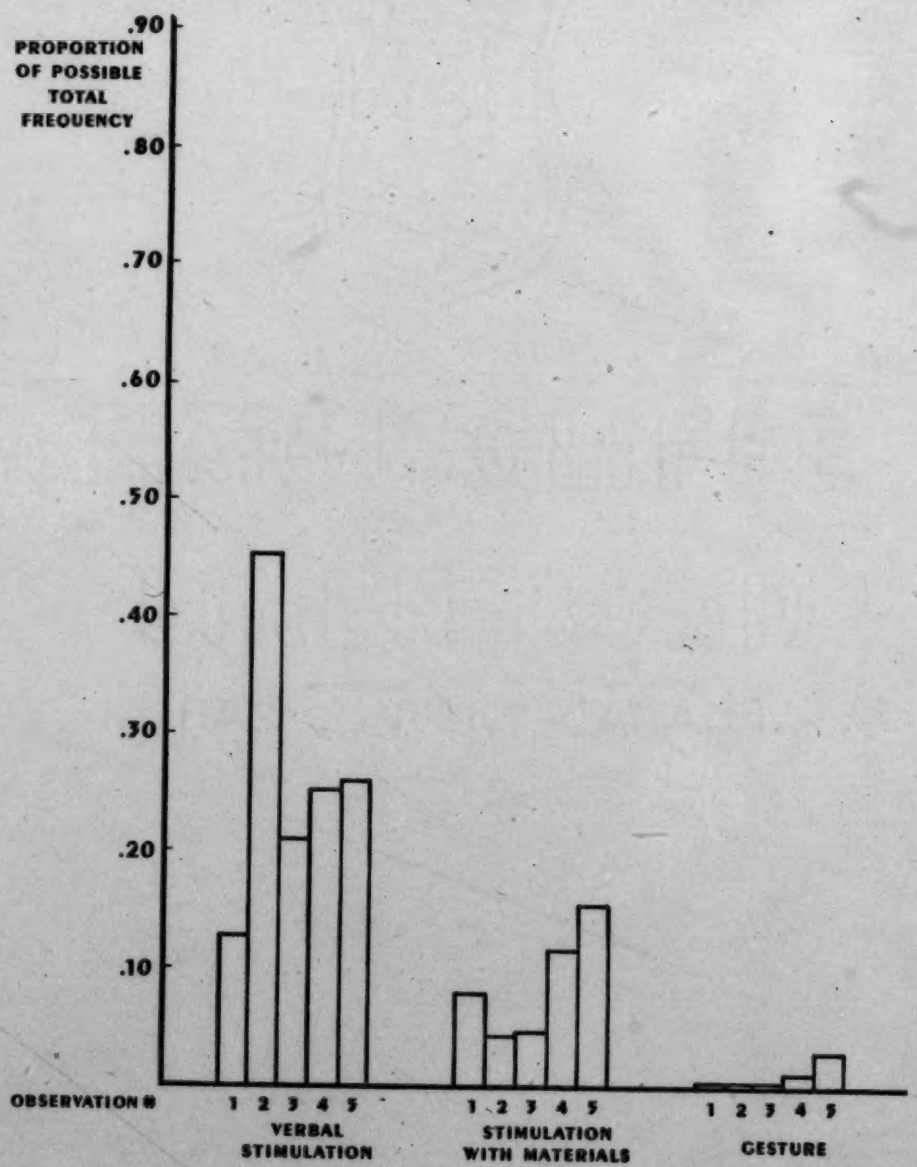
FAMILY 4.

MOTHER BEHAVIORS 17, 14 AND 19 OVER INTERVENTION PERIOD



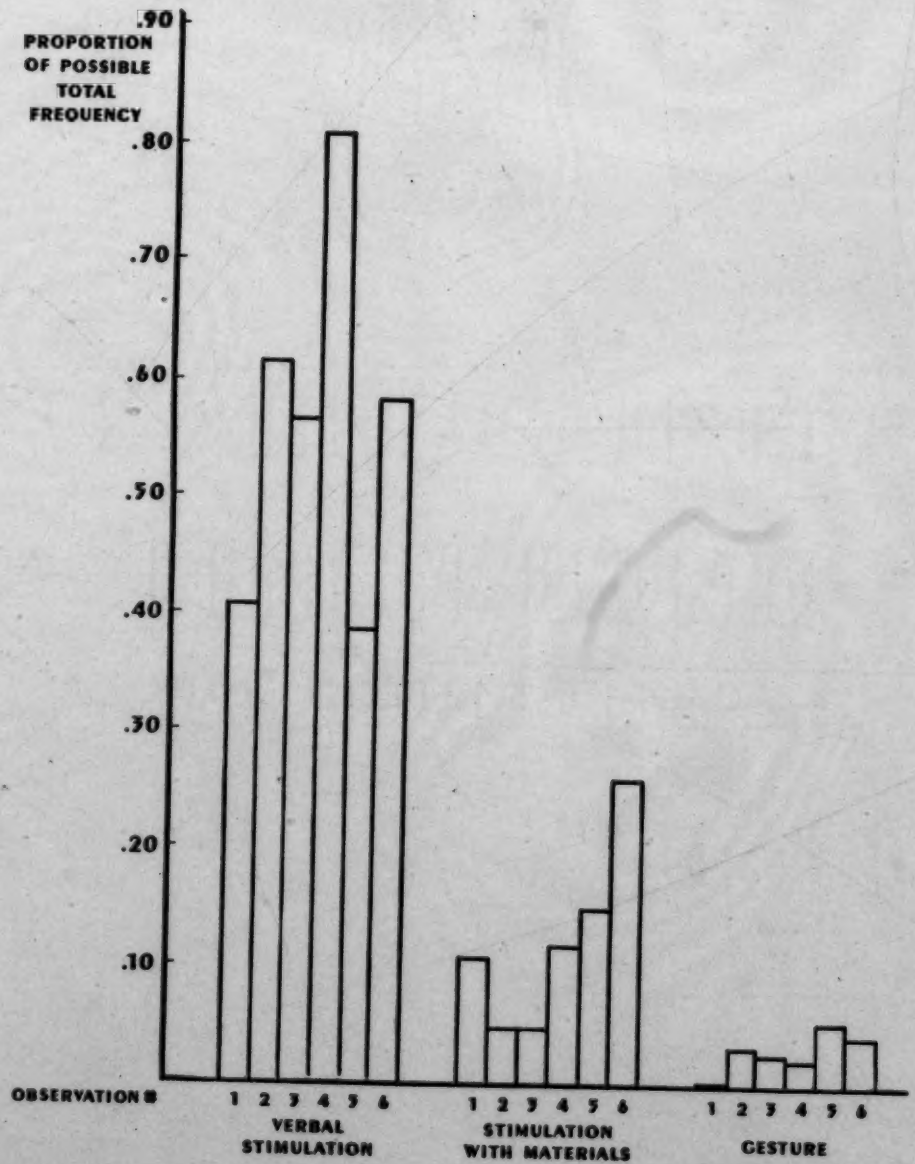
FAMILY 5.

MOTHER BEHAVIORS 17, 14 AND 19 OVER INTERVENTION PERIOD



FAMILY 6.

MOTHER BEHAVIORS 17, 14 AND 19 OVER INTERVENTION PERIOD



APPENDIX I

E-VALUES ESTIMATING THE SIGNIFICANCE OF SPECIFIC MOTHER/CHILD BEHAVIOR CO-OCCURRENCES RELATIVE TO THE ESTIMATES DERIVED FROM SIMPLE PROBABILITIES

Family 1	Observ.#1			Observ.#2			Observ.#3			Observ.#4			Observ.#5			Observ.#6		
INFANT→	01	03	08	01	03	08	01	03	08	01	03	08	01	03	08	01	03	08
MOTHER 13	2.17* 2.21*																	
↓ 14	1.17 1.31	2.51* 2.52*						2.39* 2.32*			1.15 1.21						2.53* 2.60*	
16		1.21 1.02	1.07 -	1.11 1.11			2.25* 2.25*	1.38 1.29		1.37 1.23			3.45** 3.32**			3.59** 3.40**		
17	2.15* 1.46	1.77 1.10	1.20 -		1.63 1.27		-2.94* -1.39	-2.91* -1.37						1.44 1.08				
19					1.28 1.38					1.97* 2.10*			1.97* 1.62					
Family 2																		
13	2.06* 1.38			2.30* 2.37*							-1.62 -1.44		1.42 1.84			1.16 1.23		
14		2.19* 2.36*			3.86** -			1.10 1.52			1.32 2.41*			3.44* 3.54**			1.89 1.83	
16				4.88*** 4.69***	-1.57 -1.99*		1.99* 1.97*			2.94** 2.94**	- 1.02		1.00 1.12			1.44 1.33		
17				2.85* 2.09*		-2.59* -1.87	1.00 -	-1.00 -1.15		2.56* 1.97*	1.24 1.04	2.35 1.72		2.12* 1.77				
19													2.09* 2.52*			2.29* 2.56*		
Family 3																		
13							1.89 1.75		1.54 1.38									
14					1.94 1.94			2.91* 2.91*										
16		1.74 1.71					1.62 1.51						2.40* 2.65*					
17		1.10 -	1.63 1.30	1.27 1.06			- 1.01									1.41 1.30		
19																		

Family 4	Observ.#1			Observ.#2			Observ.#3			Observ.#4			Observ.#5			Observ.#6		
INFANT→	01	03	08	01	03	08	01	03	08	01	03	08	01	03	08	01	03	08
MOTHER ↓ 13	2.11* 2.09*							3.00** 2.67*										
14						- 3.58**		3.78** 3.71**						3.93** 4.07**			2.85** 3.21**		
16	1.80 1.47						2.51* 1.97*				2.60* 2.37*			1.05 1.12				
17							1.36			1.63 1.06						1.30 1.01		
19							2.31* 2.41*											
Family 5																		
13		-1.97* 1.53		2.24* 1.78	1.22 1.01	1.88 1.49		-3.45** -2.94**							1.68 1.82			
14	2.44* 2.46*	1.08 1.28			1.43 1.64						2.37* 2.51*			2.31* 2.27*				
16	5.25*** 5.38***			3.40** 3.54**	1.00 1.06					4.07*** 4.10***			1.66 1.77					
17	2.18* 2.14*			1.73 1.43			1.78 1.66		3.02* 2.93*	3.46** 3.21**					1.33 1.30			
19															1.64 1.83			
Family 6																		
13						1.99* 1.81	1.30 1.18			1.23								1.41 1.55
14								2.56* 2.58*			4.24*** 4.33***			1.79 1.80			1.53 1.48	
16	1.13 1.22	3.19** 3.13**	2.38* 2.31*				2.96** 3.04**	2.27* 2.06*		2.32* 2.39*			3.33** 3.20**		1.61 1.51	4.35*** 4.11***		
17			2.15* 1.71							1.25 -								
19				1.40 1.60										2.48* 2.66**		1.94 2.20*		

APPENDIX J

Child (by code) 01
Age (in months) 06
(at beginning of program-Sept.'79

TIME LINE FOR EARLY EDUCATION PROGRAM

DEVELOPMENTAL AREAS		1979 September	October	November	December	1980 January	February	March	April	May	June
I.COGNITION	Reach&Grasp do		PT#1 Oct30→Nov4								
A.Operations	Take Out			Nov21 →	Dec 20						
	Put In			Nov21 →	Dec 20						
	Push			Nov28 →	Dec 20						
	Pull			Nov29 →	Dec 20						
	Take Off				Dec4	→ Jan16 (retaught)	→ Feb6	→ Mar12			
	Open				Dec7	→	Feb6				
	Close				Dec 20	→	Feb6				
	Put On				Dec7		→	Mar12			
B.Operations with Distrators	Push							Mar12 →	Apr5 →	return to probe May29*	
	Open							Mar12→	Apr1 →	May29	
	Take Out							Mar12 →	Apr5		
	Pull							Mar12→	Apr1 →	return to probe May29*	
	Put On								Apr1 →	*	
	Take Off								Apr5 →	May29	
	Close								Apr9 →		*
	Put In								Apr9 →		*
C.Body Awareness	Point to baby's eyes&mouth										June13 →
II.MOTOR	Creeping		PT#2&3 Oct30 →		Discont.Dec20						
	Crawling				Dec20 (step1)	-Jan31 (step2)	Feb6				
	Pull to Stand						Feb6	→	Apr1		
	Walking Act.1-7(s-s)							Mar12			
	Walk.with stat.ob.2ft.								Apr9 →		June13 (discont)
III.SELF HELP											
Drink from bottle unass.					Dec 20					May12	
Drink from cup unassist.										(probe)	May29→June29 (teach)
IV.LANGUAGE	Baby							Mar12			
A.Expressive	dada					Jan31 →		Mar20discont.-	retaught-	May12 discont.	
	mama					Jan31 - discont.	Feb12				
	Pat a Cake					Jan31-discont.	Feb12		Apr9 (probe)		
	Ball					Jan31 (probe)			Apr9 (probe)	-	June4 (taught)
	Teddy							Mar9-discont.			
	Nana							Mar12 (probe)	→ begin teach	June24	
	Duck									May12→	June13 discont.
	Bye-bye										
B.Receptive	Want up				Dec 20		→				June13
	Give					Jan16		→			June24
	Want drink						Feb6		→		June24
	Come here						Feb6	→	Apr9		
	Wave bye-bye								Apr1 (review)		
Point to baby/cup										May29 →	
Parent Training		Pre-program Par.Training#1-October 30						Incidental format			
		Apr18-phonecall			Reach,grasp do at level 5→Nov4 maint.						
		Par.Training#2&3			comb.Oct30.→Dec.20discont.						
		May2-parents visit school			creeping 2 feet						
		May11-home visit									
Parent-Child Observation				Obs.#1	Obs.#2	Obs.#3	Obs.#4			Obs.#5	Obs.#6
				Nov.23	Dec20	Jan28	Feb22			May6	June5

*All unlearned operations with distrators to incidental format June 13, 1980.

Child (by code) 02
Age (in months) 05
(at beginning of program Sept-79

TIME LINE FOR EARLY EDUCATION PROGRAM

DEVELOPMENTAL AREAS		1979 September	October	November	December	1980 January	February	March	April	May	June
I.COGNITION Reach&Grasp do		PT#1*Sept28 →		Nov21							
A.Operations Attending		PT#2	*Oct10 →	Nov21							
Finds hidden face		PT#3	*Oct30 →	Nov28							
Finds hidden object				Nov28	→	Jan23					
Object permanence						Jan23	→	Mar5			
Pull;Take out & give								Mar5→Mar19			
Put in								Mar12→Mar19			
Open								Mar12 → Apr9			
Put on								Mar20→ Apr9			
Close								Mar26→ Apr24			
B.Operations with distractors	Pull;Open; Take out & give*								Apr16→29		
	Put in								Apr16	→	June4
	Close								Apr23	→	June4
	Take off & give*								Apr23	→ May13	
	Put on								Apr23	→	June4
	Push									May23	→ July2
	Build a tower										June4→July16
	Build a house										July16→
II.MOTOR-Creeping 5ft				Nov21		→	Feb11				
Crawling							Feb11	→		May14	
Incidental come to sit,							Feb11 →	Mar12			
from all fours format										May14→21	
Pull to stand										May21	→ July30
Sit down											June18→July30
Crusing stand.&1hand											
III.SELF HELP											July2
Drink for glass unassist.											
IV.LANGUAGE										May13 →	July30
A.Expressive Actions & sounds	dada									June2 →	
	ah									June2 →	
	baba										
B.Receptive Actions	Want up			Nov7 → 28		→		Mar26			
	Give			Nov28				Mar3(retaught) →		May21	
	Want drink				Dec19 →	Jan9(discont.) →			Apr9 →	May21	
Want cracker/toast								Mar12			
Squeeze toy						Jan21 →		Mar12→20			
Shake rattle											
Parent Training		Pre-program contact April 30/79	*PT#1 Reach & Grasp do Sept.26→Oct10	*PT#2 Attending finds hidden Oct10 → Oct31	*PT#3 face Oct31	Nov.7-Nov28	Incidental format introduced.				
Parent-Child Observation			Obser.#1 Nov 26	Obser.#2 Dec 20	Obser.#3 Jan 28	Obser.#4 Feb 29				Obser.#5 May 1	Obser.#6 June 3

* Straight to maintenance

TIME LINE FOR EARLY EDUCATION PROGRAM

Child (by code) 03
Age (in months (at beginning of Sept '79)) 13

DEVELOPMENTAL AREAS

	1979 September	October	November	December	1980 January	February	March	April	May	June
I.COGNITION										
A.Operations Push		PT#1	Nov1-discont.			Feb1(probe)→	Mar14			
Open			Nov8		→		Mar14			
Pull		PT#2				Feb1	→	Apr15		
Close						Feb1→15				
Take out			PT#3			Feb15	→Mar14			
Take off						Feb29	→	Apr15		
Put in						Feb1→29				
Incid. Body parts/stack blks						Feb1 →				
Teach. Foamboard							Feb29 →	Apr3		
Puzzle								Apr3		
B.Operations Push								Apr15		
with Put on;Pull;										
distractors Put in								Apr15→	May2	
Take out & give									May2→21	
Close									May2→21	
Open									May2→	
Take off									May2→21	
Stack.5blks.(no model)										May21
3 blk house(with model)										May21
C.Body Point to baby's										
Awareness hair/eyes										
II.MOTOR Walk ☐ stat.obj.				Dec7		→				June6→
Walk ☐ finger assist.				Dec21 →		Feb1(discont.)				June21
Walk ☐ 2 hand assist.						Feb1-Feb29(discont.)				
Walk ☐ 1 hand assist.						Feb29 →		Apr15		
Walk ☐ flexible obj.								Apr15 →		June6(discont.)
III.SELF HELP						Feb15(level 1;step1) →			May2(step4)	
Drink from glass unassist.						Feb15 → Mar4				
Eat with spoon unassist.								baseline	May21-begin teach.Jul19	
Toilet train.baseline										
IV.LANGUAGE Clap Hands				Dec21 →	Jan18(discont.)					
mama				Dec21 →		Feb1(discont.)				
dada						Feb1 →	Mar14			
ah					Jan29	→		Apr15(discont.)		
ah ☐ baby					Jan29	→		Apr15		
paper								Apr15→	May15	
teddy									May2→21	
book;eye									May21	
B.Receptive Want up			**Nov30	→		Feb15				
Give			Nov30	→		Feb15				
Come here				Dec31 →		Feb15				
Want drink						Feb1	→		May2	
—Want cookie/toy						Feb15	→	Apr3		
Point to hat and spoon							Mar14	→	May2(discont.)	
Point to car and book									May2→June9(discont.)	
Replaced by pt car&crayon									June9 →	
Parent Training	June15/79 -initial visit	*PT#1(Lev.5) Eye tracking 180-Oct.12	*PT#2(Lev.3) Attend.to name &"look" Oct25→Dec7		*PT#3 "put on" (Lev.1) Nov1 → Feb15	**Incidental format introduced Nov.30 (want up)				
Parent-Child Observation			Obs.#1 Nov. 1	Obs.#2 Nov. 29	Obs.#3 Jan. 15	Obs.#4 Feb. 22		Obs.#5 Apr. 1	Obs.#6 May 5	Obs.#7 June 4

Child(by code) 04
Age (in months) 05
(at beginning of program-Sept'79)

TIME LINE FOR EARLY EDUCATION PROGRAM

DEVELOPMENTAL AREAS	1979 September	October	November	December	1980 January	February	March	April	May	June	July
I.COGNITION Reach&Grasp do	PT#1*Sept28	→ Oct12									
A.Operations Attending	PT#2	*Oct12	→ Nov9								
Finds hidden face	PT#3	*Oct26		→	Jan17						
Finds hidden object				Dec21	→		Mar4				
3 Cloth Displacement							Mar4 →	Apr11			
Put in							Mar28	→	May2		
Take off								Apr11→	May9		
Pull‡Push‡Take out‡Close, Open							Mar28	→	May9*		
B.Operations Push											Jul17
with *Open											Jul25*
distractors*Close											Jul25*
*Take off											Jul25*
*Take out											Jul25*
*Pull											Jul25*
*Put in											Jul25*
*Put on											Jul25*
Build a tower											Jul17
II.MOTOR Creeping			Nov16	→ Dec21(2ft)→Jan29(5ft)							
(Incidental Crawling					Jan24	→			May16		
Format) Pull to stand					Jan24	→	Mar21				
Come to sit from lying							Mar21	→	May2		
Cruising furniture*											Jul11*
III.SELF HELP											
Drink from cup unassist.									May16		
(Incidental format)											
IV.LANGAUGE											
A.Expressive											
B.Beceptive Want up			Nov9 - discont.								
Give				Dec21		→			May21		
Want drink							Mar14	→	May16		
Bye Bye									May9 →		
Want cookie											Jul17→
Actions: Stir ☕ spoon							Mar	→			
(incidental)Push toy							Mar	→			
Parent Training	Pre-program contact June30/79	*PT#1 Reach& Grasp do Sept28 → Oct12		*PT#2 Attending Oct12-Nov16		*PT#3 Finds hidden face Oct26-Jan24		Nov 28 format	Incidental introduced		
Parent-Child Observation		Obs.#1 Oct29		Obs.#2 Nov30		Obs.#3 Jan21	Obs.#4 Feb 29	Obs.#5 Mar 31	Obs.#6 May 7		

Child (by code) 05
Age (in months) 06
(at beginning of program Sept'79)

TIME LINE FOR EARLY EDUCATION PROGRAM

DEVELOPMENTAL AREAS	1979 September	October	November	December	1980 January	February	March	April	May	June
I.COGNITION Eye tracking 180	PT#1*	Oct11→25								
Attending	PT#2	Oct25 →		Dec20						
Reach & grasp do			PT#3	*Dec6 →	Jan17					
Finds hidden face					Jan17 →		Mar20			
*Finds hidden object							Mar20 →	Apr10		
3 cloth displacement							Mar20 →		May1	
A.Operations Take off & give									May1→25	
Pull									May1→15	
Close									May8→ June5	
Take out & give									May15→ June16	
Open									June5 →Jul3	
Push									May22 → Jul17	
Put on										Jul10 →
Put in										June24→
II.MOTOR Sitting-back sup.							Mar13 →		May8	
Sitting-self sup.									May8 →	
*Rolling from back to stom.									May8	
Get up (for crawling)										June26 →
III.SELF HELP										
IV.LANGUAGE										
A.Expressive										
B.Receptive Want up				Dec20		→			May15	
Want drink										Jul3
Shake rattle								Apr10		
Actions: Move apple(toy)									May1→22	
Knock table										June26 →
Parent Training	Pre-program contact: May 16/79	*PT#1 eye tracking 180° Oct1-25	*PT#2 attend. Oct25-Dec20	*PT#3 reach and grasp do Dec6-Jan17			Incidental format introduced Dec 20			
Parent-Child Observation		Obs.#1 Oct26		Obs.#2** Dec19	Obs.#3 Jan14	Obs.#4** Feb18		Obs.#5*** Apr29		

* straight to maintenance
** delayed due to child's illness
*** observations terminated at mother's request

Child (by code) 06
Age (in months) 03
(at beginning of program-Sept'79)

TIME LINE FOR EARLY EDUCATION PROGRAM

DEVELOPMENTAL AREAS	1979 September	October	November	December	1980 January	February	March	April	May	June
I.COGNITION Eye tracking	PT#1	Oct4→11								
A.Operations Looks at hand	PT#2	Oct11 →	Nov15							
Reach for stat. object	PT#3	Oct23 →	Nov11							
Reach for do		Oct25 →		Dec19						
Attending			Nov6→22							
Finds hidden face				Dec19 →		Feb14				
Finds hidden object							Mar13*			
3 cloth displacement							Mar13 →	Apr3		
A.Operations Put in							Mar3		→	Jul22
Close							Mar3	→	May15	
Push									May22	→ Jul22
Open									May1 →	June5
Take off & give									May1→15*	
Pull									May22	→June5
Take out									May22	→June5*
II.MOTOR Sitting-back sup.			Nov15		→		Mar13			
Sitting-self sup.							Mar13→27			
Sitting-unsupported								Apr10*		
Creeping								Apr23	→	June12
Get up (crawl position)										June5→
III.SELF HELP										
Drink from cup -assisted										June12
Incidental format										
IV.LANGUAGE Sounds dada									May7 →	June25
A.Expressive actions mama									May15→	June25
ah										June5→25
Words ball										June25
cup										June25
B.Receptive bye bye					Jan24	→			May22	
give							Mar12	→	May22	
want drink									May7→22	
want cookie										June25*
Actions: shake rattle							May27→Apr10			
squeeze toy								Apr3→24		
roll ball								Apr3*		
spin ball								Apr10→24		
Point to bunny & cup										June12
Parent Training	Pre-program contact June 8	PT#1 eye track- ing. Oct4-11	PT#2 Looks at hand Oct11-Nov15	PT#3 Reach for stat. obj. Oct25-Nov11		November 22 Incidental format introduced				
Parent-Child Observation		Obs.#1 Oct31	Obs.#2 Nov27		Obs.#3 Jan14		Obs.#4 Mar24	Obs.#5 Apr30		Obs.#6 June2

*straight to maintenance